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INSECTA MUNDI

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New country records, annotated checklist and key to
the dacine fruit flies (Diptera: Tephritidae: Dacinae: Dacini)
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New country records, annotated checklist and key to the dacine fruit flies (Diptera: Tephritidae: Dacinae: Dacini) of Bangladesh

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Abstract. Thirty-four species of dacine fruit flies (Diptera: Tephritidae) were recorded in Bangladesh, based on field surveys carried out between 2013 and 2020. Five species are reported in Bangladesh for the first time: *Bactrocera aethriobasis* (Hardy), *B. limbifera* (Bezzi), *B. melania* (Hardy and Adachi), *B. nigrifemorata* Li and Wang, and *Dacus jacobii* David and Sachin. The attraction of *B. nigrifemorata* to cue-lure is a new male lure association. An annotated checklist and illustrated key to the species are provided.

Key words. *Bactrocera*, *Dacus*, *Zeugodacus*, pest, taxonomy.

ZooBank registration. urn:lsid:zoobank.org:pub:A6DE8E5B-98F9-4F31-BE36-E84EC1DB596F

Introduction

Systematic field surveys of dacine fruit flies in Bangladesh have been ongoing since 2013, initially focused on rural farmland and village environments throughout the country (Leblanc et al. 2013, 2014), and expanded to protected forest areas in 2016 (Leblanc et al. 2019b). As a result, the number of species recorded in Bangladesh has increased from seven to 15 (Leblanc et al. 2013), 20 (Leblanc et al. 2014) and 29 (Leblanc et al. 2019b). We include five new country records and one new lure association in this paper and provide an annotated checklist, with up-to-date distributions, lures, host records, and citations to published research on the ecology and control in Bangladesh for each of the 34 species.

Materials and Methods

We carried out regular snap-shot surveys in agricultural environments and protected forest areas by maintaining, for a few days, series of traps (described in Leblanc et al. 2015a) separately baited with three different male lures plus a 10x10mm piece of dichlorvos (DDVP) insecticide strip to kill trapped flies. We baited traps with

commercially available cue-lure and methyl eugenol plugs (Scentry Biologicals, Billings, Montana), or dental cotton wicks dipped in zingerone (= vanillylacetone) (Sigma-Aldrich) melted over a hot plate and allowed to solidify in the wicks. Between April 2013 and October 2020, we deployed traps at 614 sites, either as individual sites scattered over rural areas or as series of sites, about 50 meters apart along roads or trails, in protected forest areas.

Sites surveyed between 2013 and 2018 are described in detail in Leblanc et al. (2019b). More recent surveys, carried out in protected forest areas in 2019 and 2020, covered 231 sites in the Chattogram Hill tracts (Kaptai National Park, Alu Tila Hill, Zero Mile Tila Hill, Banashree Tila Hill, Panchari Forest Range), Dinajpur District (Dharmapur Forest, Ramsagar National Park, Singra National Park), Gazipur District (Chandra Forest Range), and Tangail District (Baro Choana Forest).

Sampled flies were stored in 95% ethanol in a -20°C freezer, to preserve DNA for analysis. All flies were identified by the first two authors, using available keys (Drew and Romig 2013, 2016). For series of selected specimens, DNA was extracted and the Cytochrome C Oxidase I (COI) and Elongation Factor 1-alpha (EF1-alpha) genes were sequenced to help confirm species identifications (Leblanc et al. 2019b). Reference voucher collections of double-mounted flies are preserved at the University of Hawaii Insect Museum (UHIM) and the University of Idaho's William F. Barr Entomological Museum (WFBM). Before drying flies for double-mounting, we pinned them through the scutum with a minuten pin and soaked them in ethyl-ether for 3–12 hours to fix and preserve their natural coloration. We photographed specimens using a Nikon D7100 camera attached to an Olympus SZX10 microscope and used Helicon Focus pro v6.7.1 to merge pictures taken at a range of focal planes.

The annotated checklist included in this paper covers cumulative data from all the snap-shot surveys described above, and from a two-year population monitoring study carried out in Dhaka (Hossain et al. 2019), for a total of 188,135 specimens collected and identified to species level. Except for females of *B. melania* (Hardy and Adachi) and *B. latifrons* (Hendel) bred from fruit, almost all collected specimens reported in the checklist are males. We also provide a key to the species with color plates. Red arrows in the figures indicate key characters referred to in key couplets. Detailed collection records for each of the species are available on the Global Diversity Information Facility (GBIF) (<https://doi.org/10.15468/dl.yurtw8>).

Annotated checklist of dacine fruit flies recorded in Bangladesh

Bactrocera (Parazeugodacus) abbreviata (Hardy, 1974)

Figure 1

Distribution. Philippines (Hardy 1974), China, Thailand (Drew and Romig 2013), Vietnam (Leblanc et al. 2018a), Bangladesh (Leblanc et al. 2019b), Nepal (Leblanc et al. 2019a), Indonesia (Dooreenweerd et al. 2020).

Bangladesh records. 63 specimens. CHATTOGRAM DIVISION: Chattogram District. DHAKA DIVISION: Dhaka District.

Male lure. Zingerone.

Host plants. *Chionanthus ramiflorus* Roxb. and *Olea salicifolia* Wall. ex G. Don (Oleaceae) (Allwood et al. 1999).

Notes. Dooreenweerd et al. (2018) noted that *B. abbreviata* may be conspecific with and junior synonym to *B. bipustulata* (Bezzi, 1914), known from Sri Lanka and southern India.

Bactrocera (Bactrocera) aethriobasis (Hardy, 1973)

Figure 2

Distribution. Thailand (Hardy 1973), Malaysia (Peninsular) (Norrbom et al. 1999), Bhutan, Vietnam (Drew and Romig 2013), Cambodia (Leblanc et al. 2016), India (David et al. 2017), Nepal (Leblanc et al. 2019a), Bangladesh (NEW COUNTRY RECORD).

Bangladesh records. One specimen. CHATTOGRAM DIVISION: Rangamati Hill District, Kaptai National Park (Bangchari Range), 25-vii-2019, methyl eugenol trap, M. Aftab Hossain. Specimen deposited in WFBM.

Male lure. Methyl eugenol.

Host plants. *Azadirachta indica* A. Juss. (Meliaceae) (Drew and Romig 2013).

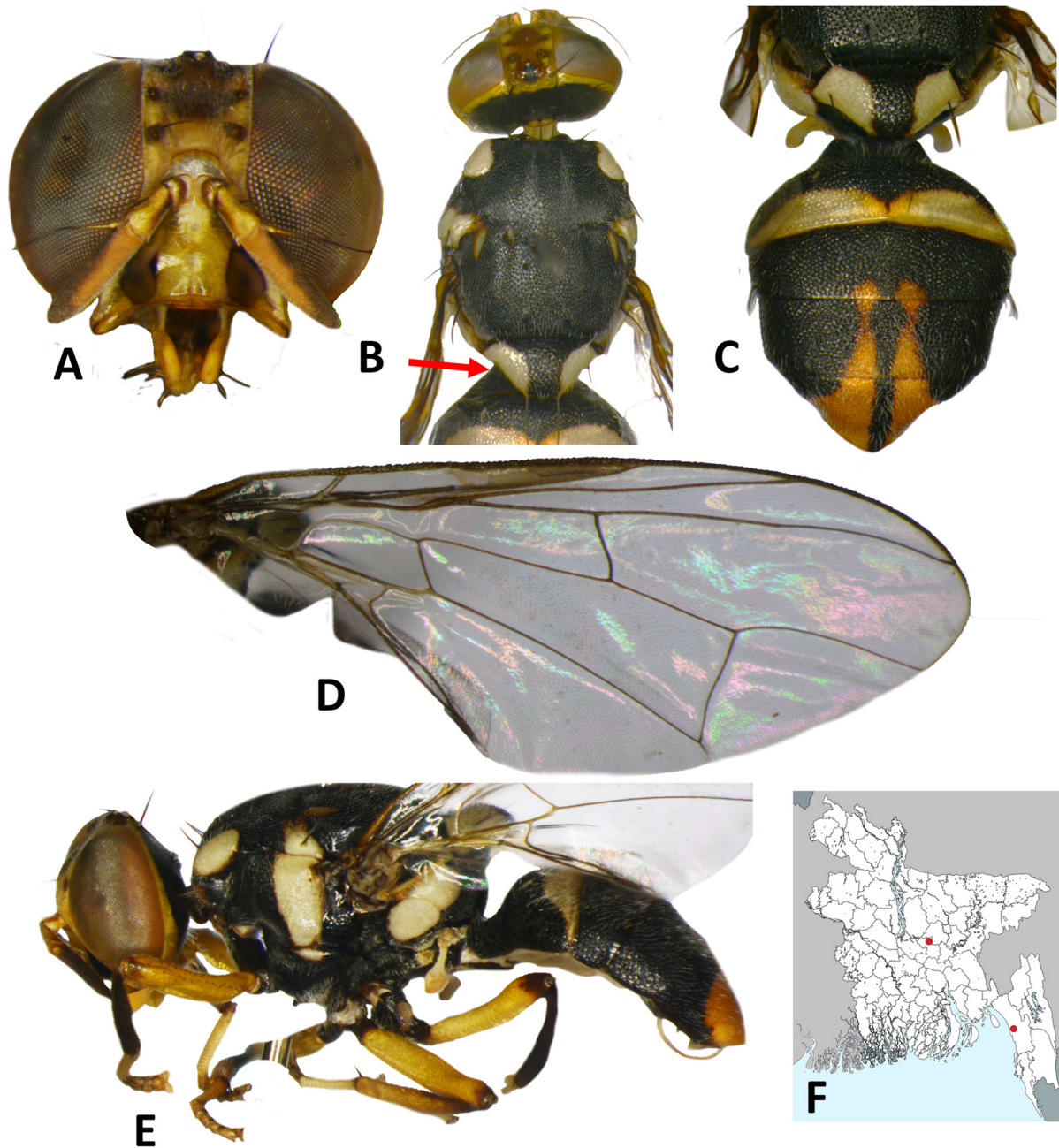


Figure 1. *Bactrocera* (*Parazeugodacus*) *abbreviata* (Hardy), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

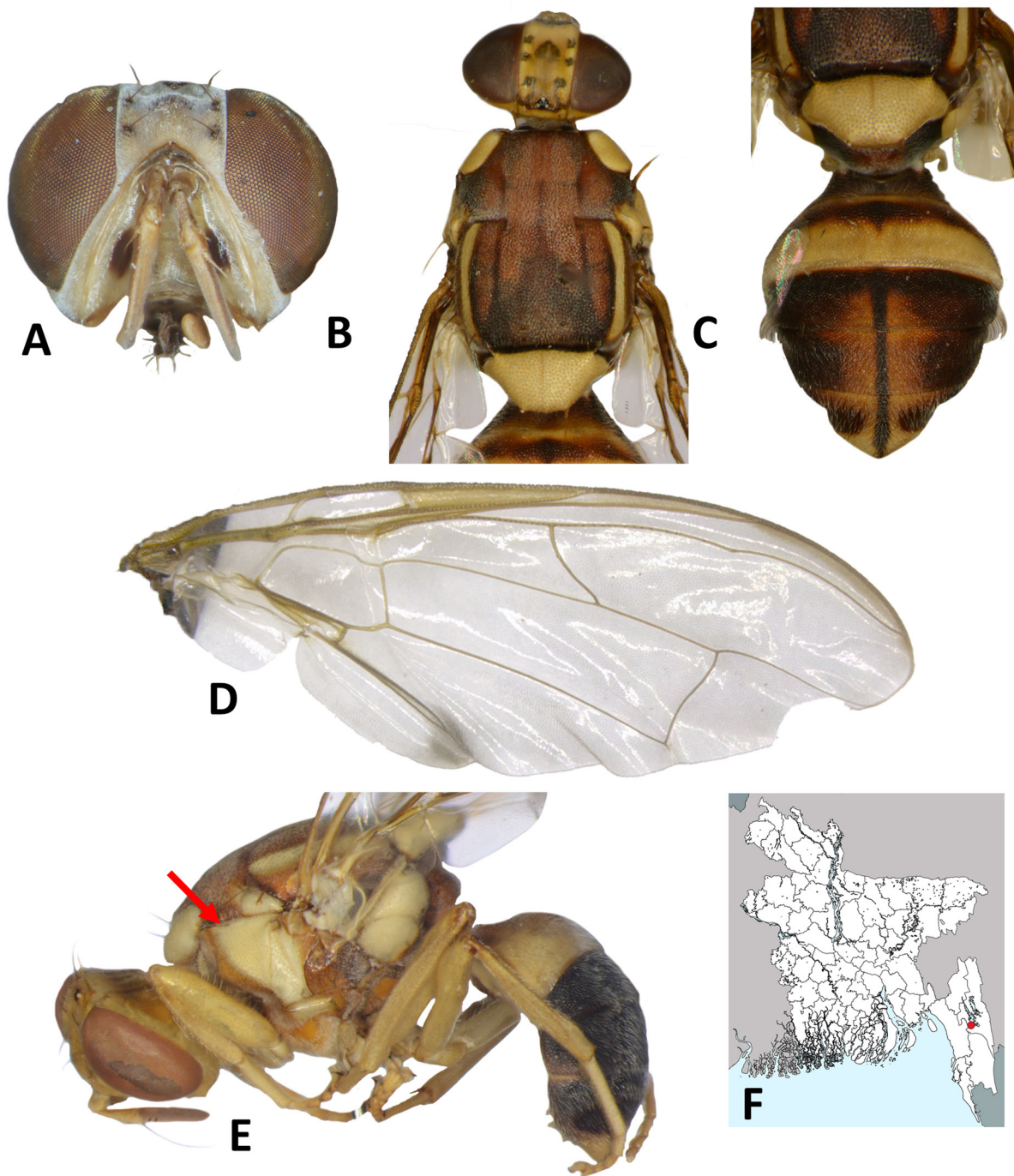


Figure 2. *Bactrocera* (*Bactrocera*) *aethriobasis* (Hardy), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

***Bactrocera (Bactrocera) bhutaniae* Drew and Romig, 2013**

Figure 3

Distribution. Bhutan, India (Andaman Island), Vietnam, Thailand (Drew and Romig 2013), Laos, Cambodia, China (Leblanc et al. 2016), Bangladesh (Leblanc et al. 2014, 2019b).

Bangladesh records. 10 specimens. CHATTOGRAM DIVISION: Bandarban Hill and Rangamati Hill Districts. SYLHET DIVISION: Moulvibazar and Sylhet Districts.

Male lure. Cue-lure.

Host plants. *Xylosma brachystachys* Craib (Salicaceae) (Drew and Romig 2013).

***Bactrocera (Bactrocera) carambolae* Drew and Hancock, 1994**

Figure 4

Distribution. Malaysia (Peninsular, East), Indonesia, Singapore, Thailand, India (Andaman Island), Vietnam (Drew and Romig 2013), Cambodia (Leblanc et al. 2016), Bangladesh (Leblanc et al. 2019b). Introduced in French Guiana, Surinam (Drew and Hancock 1994), and Guyana (Norrbon et al. 1999).

Bangladesh records. 172 specimens. CHATTOGRAM DIVISION: Chattogram, Cox's Bazar, and Khagrachari Hill Districts. SYLHET DIVISION: Habiganj District.

Male lure. Methyl eugenol.

Host plants. This polyphagous fruit pest infests 100 host taxa in 58 genera and 38 families (Allwood et al. 1999; Liquido et al. 2016b).

***Bactrocera (Bactrocera) correcta* (Bezzi, 1916)**

(= *Dacus dutti* Kapoor, 1971, *Strumeta paratuberculatus* Philip, 1950, *Dacus bangaloriensis* Agarwal and Kapoor, 1983)

Figure 5

Distribution. Widespread in Asia, from Pakistan east to Vietnam and south to Peninsular Malaysia (Drew and Romig 2013), Bangladesh (Leblanc et al. 2014), Laos, Cambodia (Leblanc et al. 2016).

Bangladesh records. 656 specimens. CHATTOGRAM DIVISION: Chattogram and Cox's Bazar Districts. DHAKA DIVISION: Dhaka District.

Male lure. Methyl eugenol.

Host plants. A polyphagous pest of cultivated fruits, bred from 91 host taxa in 59 genera and 36 families (Allwood et al. 1999; Liquido et al. 2020).

Notes. In Bangladesh, Hossain et al. (2019) studied the seasonal abundance of *B. correcta* in relation to abiotic factors and host plants.

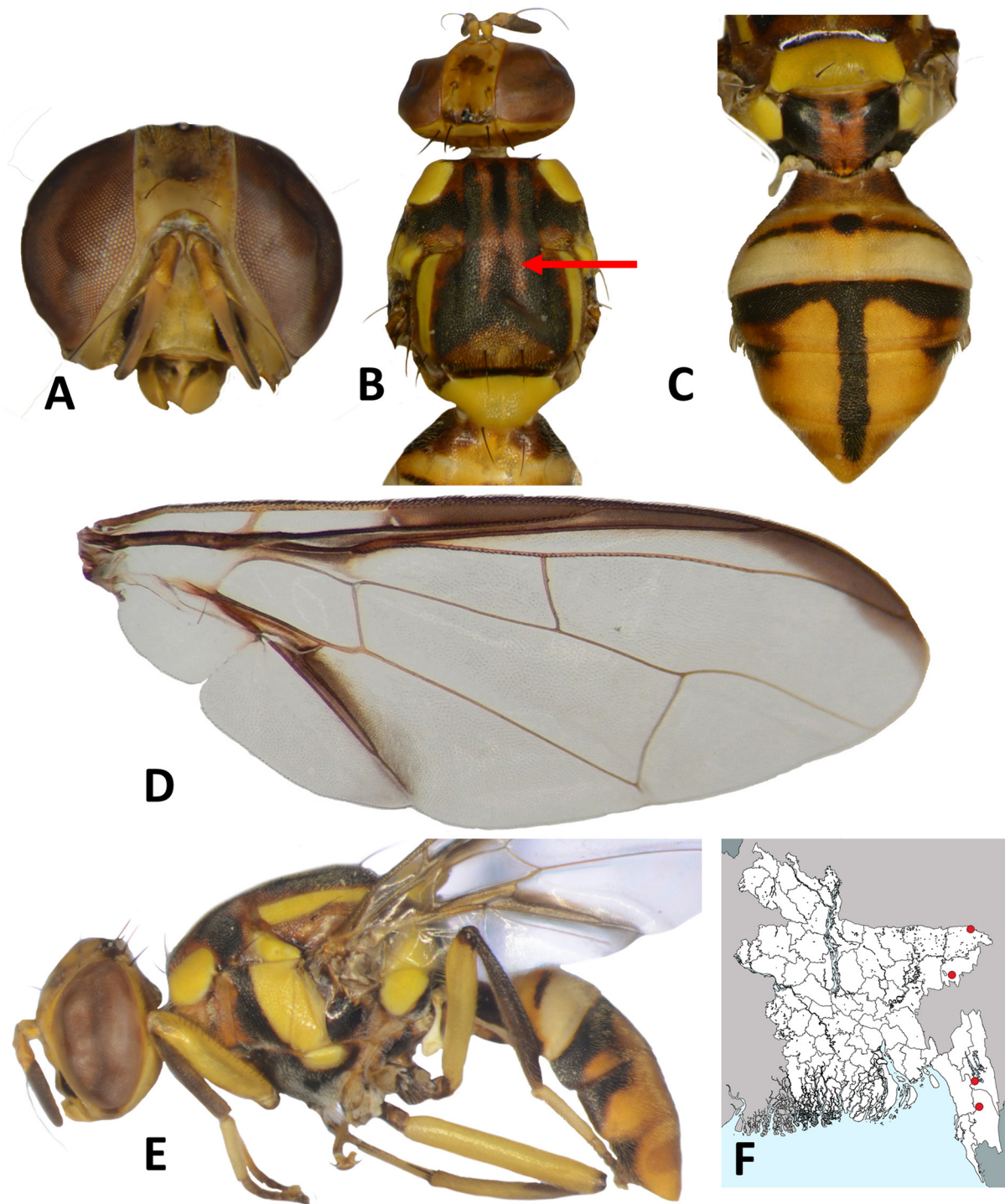


Figure 3. *Bactrocera* (*Bactrocera*) *bhutaniae* (Hardy), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing (after Leblanc et. al. 2014). E) Lateral view. F) Distribution in Bangladesh.

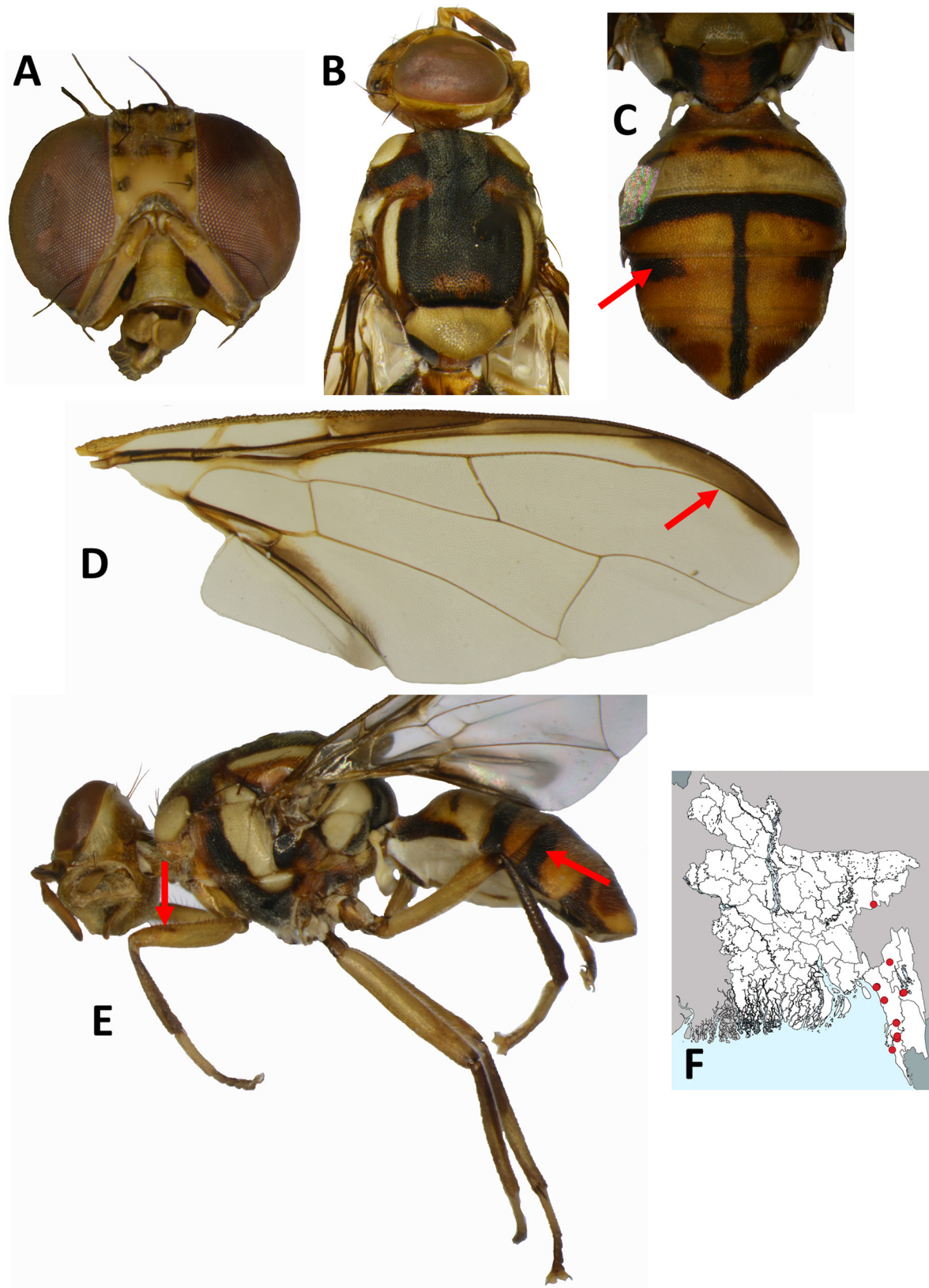


Figure 4. *Bactrocera (Bactrocera) carambolae* Drew and Hancock, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

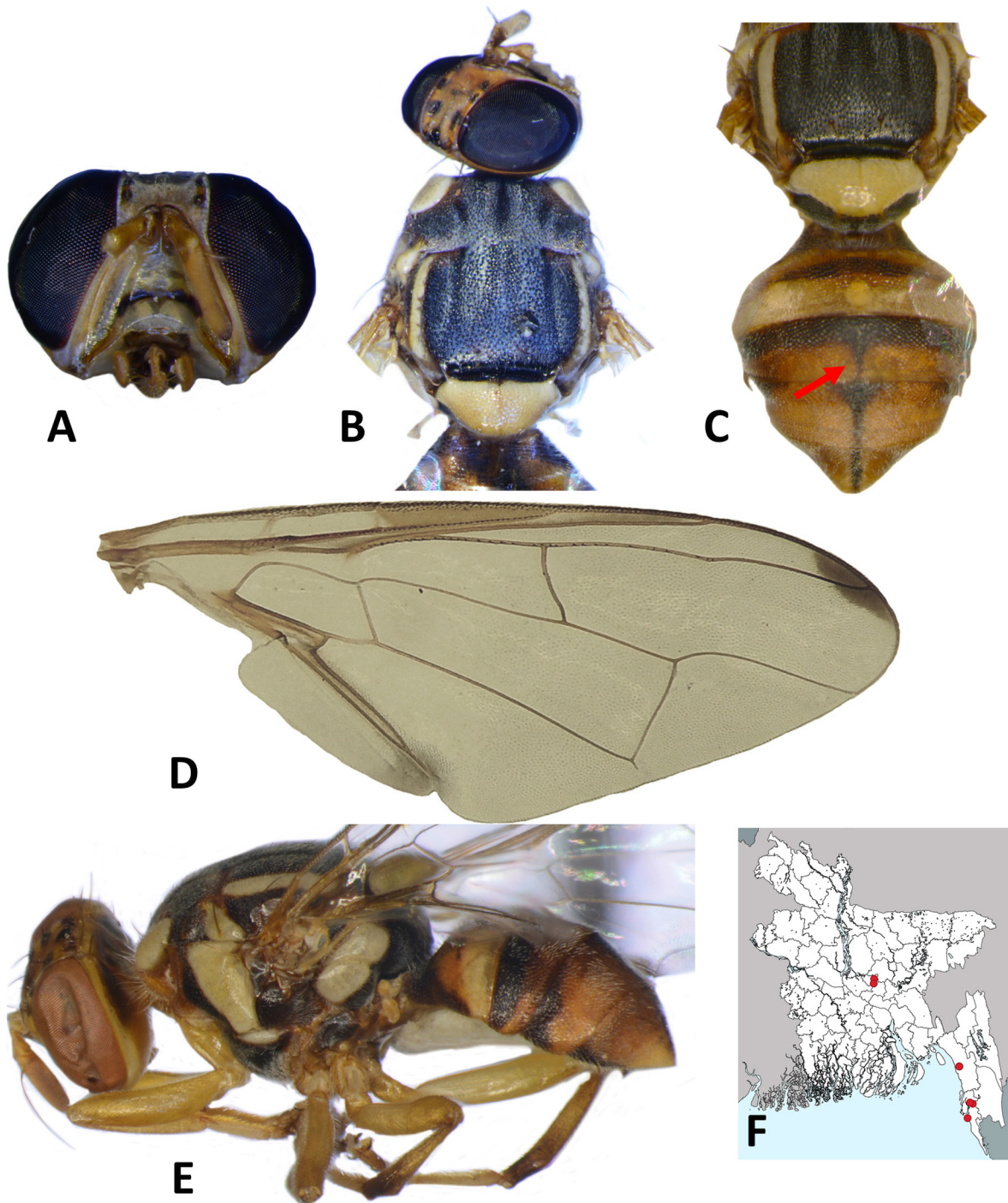


Figure 5. *Bactrocera (Bactrocera) correcta* (Bezzi), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing (after Leblanc et. al. 2014). **E)** Lateral view. **F)** Distribution in Bangladesh.

***Bactrocera (Daculus) digressa* Radhakrishnan, 1999**

(= *Bactrocera yercaudiae* Drew in Drew and Raghu 2002)

Figure 6

Distribution. India (Radhakrishnan 1999), Bangladesh (Leblanc et al. 2013), Nepal (Leblanc et al. 2019a).

Bangladesh records. 69 specimens. DHAKA DIVISION: Dhaka and Gazipur Districts. RAJSHAHI DIVISION: Chapai Nawabgonj, Joypurhat, Naogaon, and Pabna Districts. RANGPUR DIVISION: Dinajpur District.

Male lure. Cue-lure, zingerone.

Host plants. *Alangium salviifolium* (L.f.) Wangerin (Cornaceae) (David and Ramani 2011).

***Bactrocera (Bactrocera) dorsalis* (Hendel, 1912)**

(= *Musca ferruginea* Fabricius, 1794, *Bactrocera conformis* Doleschall, 1858, *Chaetodacus ferrugineus* var. *okinawanus* Shiraki, 1933, *Dacus semifemoralis* Tseng, Chen and Chu, 1992, *Dacus yilanensis* Tseng, Chen and Chu, 1992, *Bactrocera papayae* Drew and Hancock, 1994, *Bactrocera philippinensis* Drew and Hancock, 1994, *Bactrocera invadens* Drew, Tsuruta and White, 2005, *Bactrocera variabilis* Lin and Wang in Lin et al. (2011))

Figures 7–8

Distribution. Widespread through tropical Asia, from Pakistan to Taiwan and south to New Guinea; introduced to Africa and various islands in the Indian and Pacific Oceans (see map in Vargas et al. 2015).

Bangladesh records. 118,942 specimens. BARISHAL DIVISION: Barishal and Jhalokathi Districts. CHATTOGRAM DIVISION: Bandarban Hill, Bramhanbaria, Chandpur, Chattogram, Cox's Bazar, Cumilla, Feni, Khagrachari Hill, Laxmipur, Noakhali, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Faridpur, Gazipur, Gopalganj, Kishorgonj, Madaripur, Manikganj, Munshiganj, Narayanganj, Narsingdi, Rajbari, Shariatpur, and Tangail Districts. KHULNA DIVISION: Chuadanga, Jashore, Jhenaidah, Khulna, Kushtia, Magura, Meherpur, Narail, and Satkhira Districts. MYMENSINGH DIVISION: Jamalpur, Mymensingh, Netrokona, and Sherpur District. RAJSHAHI DIVISION: Bogura, Chapai Nawabgonj, Joypurhat, Naogaon, Natore, Pabna, Rajshahi, and Sirajganj Districts. RANGPUR DIVISION: Dinajpur, Gaibandha, Kurigram, Lalmonirhat, Nilphamari, Panchagarh, Rangpur, and Thakurgaon Districts. SYLHET DIVISION: Habiganj, Moulvibazar, Sunamgonj, and Sylhet Districts.

Male lure. Methyl eugenol, zingerone (but no record of attraction to latter in Bangladesh yet).

Host plants. A highly polyphagous fruit pest with reliable published records for 500 host taxa in 219 genera and 81 families (Allwood et al. 1999; Liquido et al. 2021). Recorded hosts in Bangladesh include mango (*Mangifera indica* L. - Anacardiaceae), carambola (*Averrhoa carambola* L. - Oxalidaceae), and guava (*Psidium guajava* L. - Myrtaceae) (Kabir et al. 1991).

Notes. Oriental fruit fly is by far the most numerous species in Bangladesh. On the Indian subcontinent, including Bangladesh, this species exhibits a broad range of scutum color pattern variation, similar to that in Africa (Leblanc et al. 2013) (Fig. 7E–L), whereas further east, the dark scutum form is dominant (Fig. 7B). In Bangladesh, Hossain et al. (2019) studied the seasonal abundance of *B. dorsalis* in relation to abiotic factors and host plants for making management decisions. Male annihilation technique is practiced to control this pest fly in the northwestern part of Bangladesh (Uddin et al. 2016). To optimize the required irradiation dose for post-harvest quarantine treatments, Akhter et al. (2008) monitored adult emergence from treated bananas artificially infested with third instar larvae. They observed that a 150 Gy treatment completely prevented larval development and adult emergence. The parasitoid wasp *Diachasmimorpha longicaudata* (Ashmead, 1905) (Hymenoptera: Braconidae) was bred by Mahfuza Momen from larvae of *B. dorsalis* infesting guava, in September 2019, at the Atomic Agency Research Establishment compound, in Savar, Dhaka.

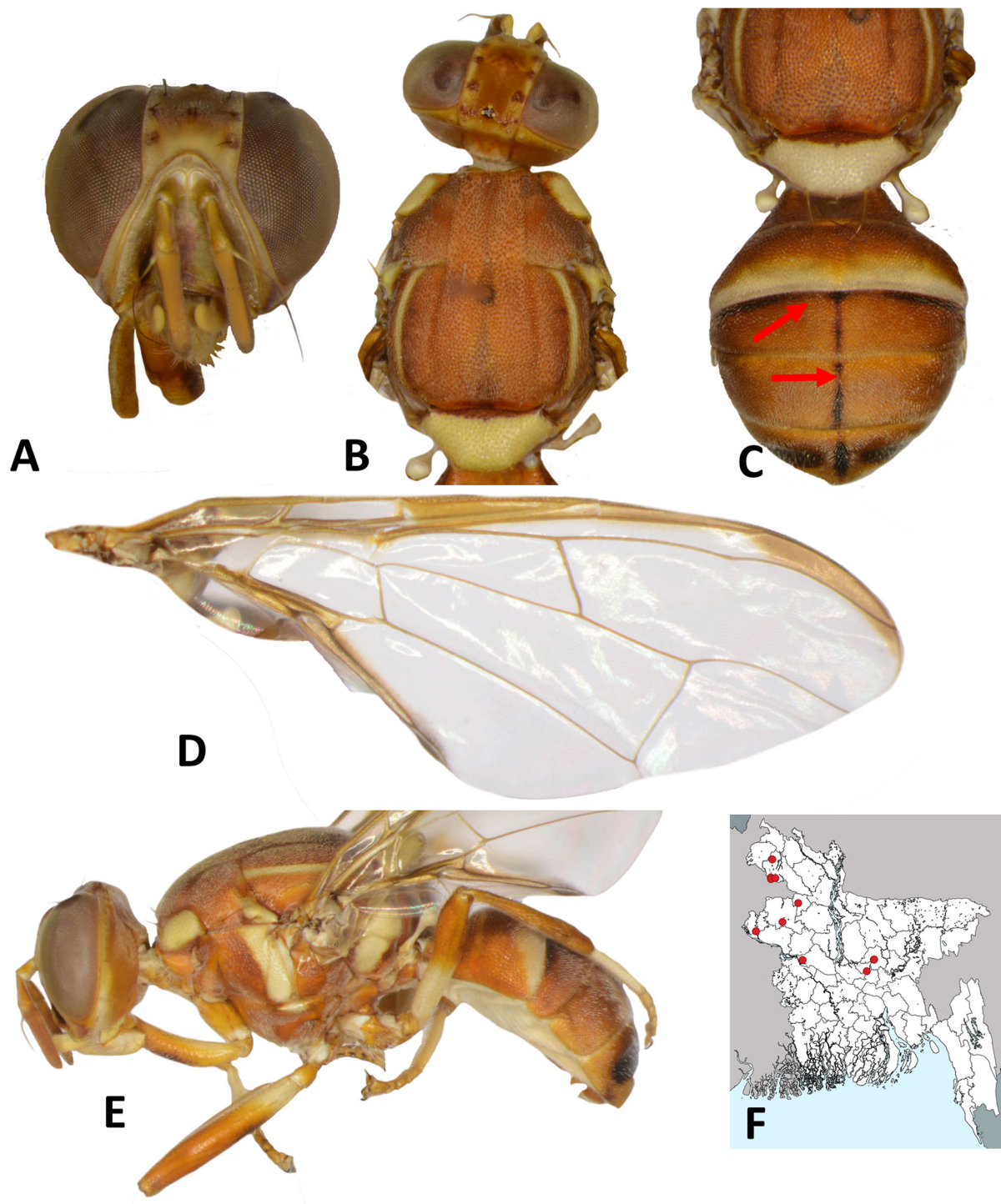


Figure 6. *Bactrocera (Daculus) digressa* Radhakrishnan, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

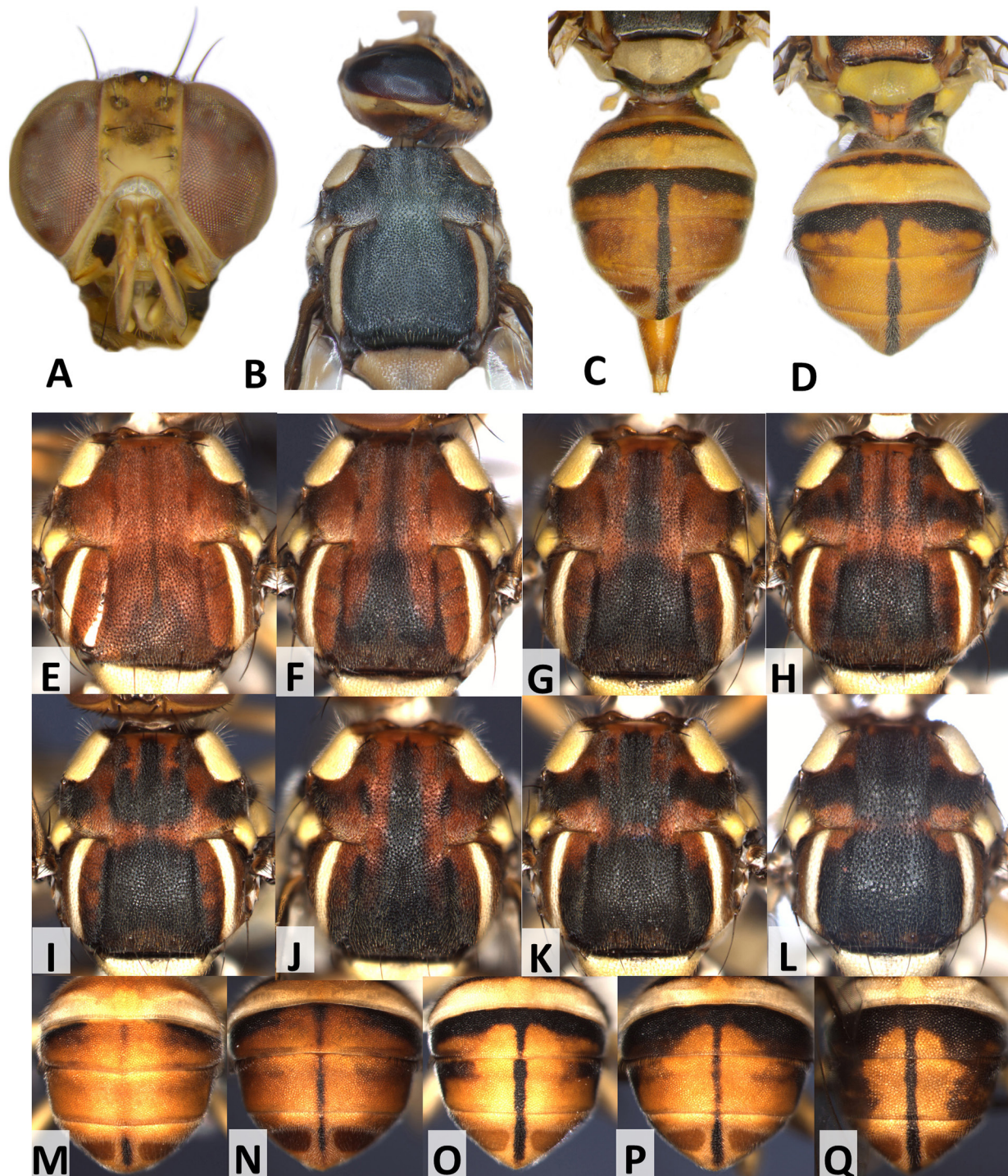


Figure 7. *Bactrocera* (*Bactrocera*) *dorsalis* (Hendel). A) Head. B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E–L) Scutum variation in Bangladesh (after Leblanc et al. 2013). M–Q) Abdomen variation in Bangladesh (after Leblanc et al. 2013).

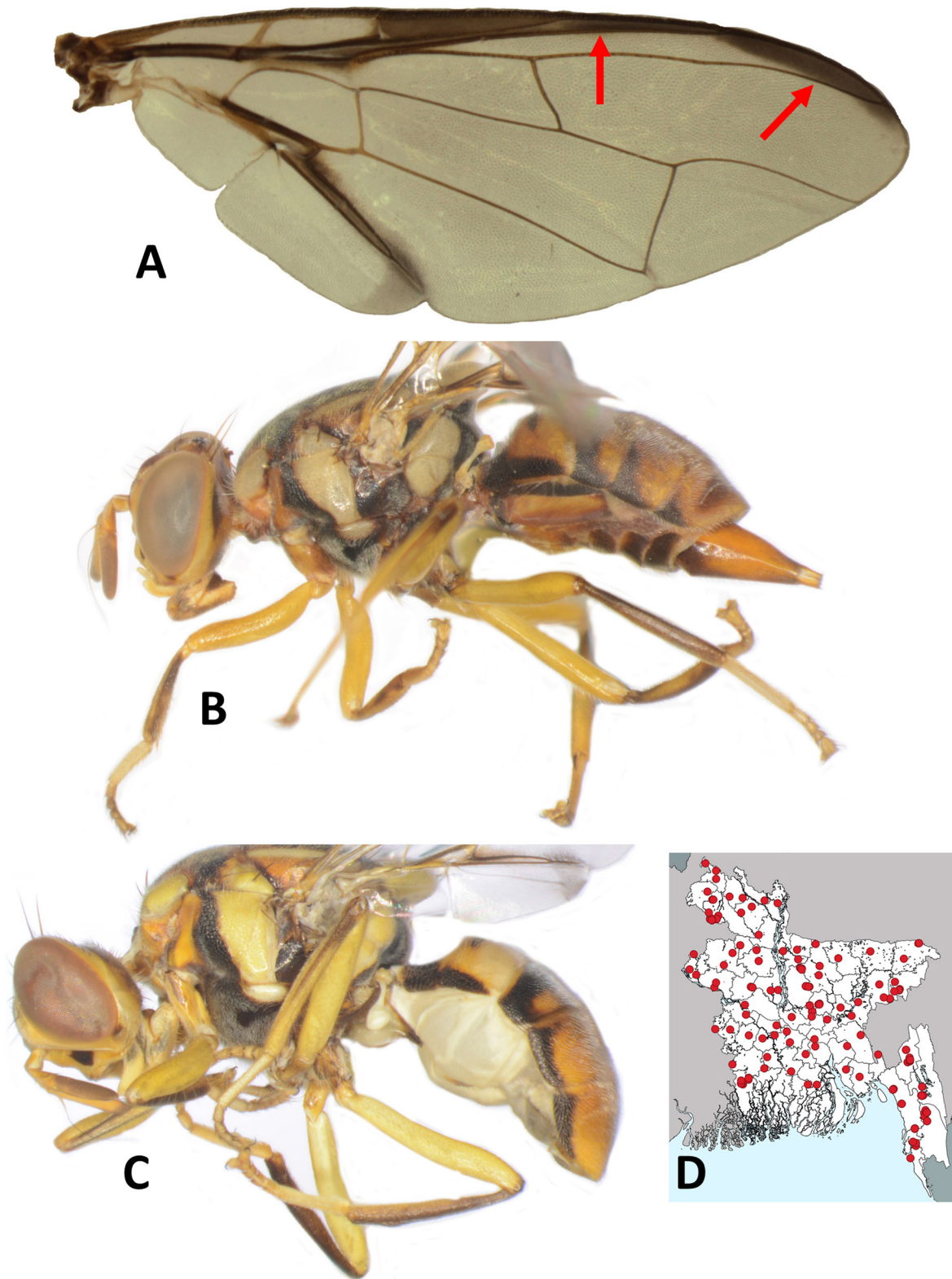


Figure 8. *Bactrocera (Bactrocera) dorsalis* (Hendel). A) Wing (after Leblanc et al. 2014). B) Lateral view, female. C) Lateral view, male. D) Distribution in Bangladesh.

***Bactrocera (Bactrocera) latifrons* (Hendel, 1915)**

(= *Dacus amoyensis* Froggatt, 1909, *Chaetodacus antennalis* Shiraki, 1933)

Figure 9

Distribution. Widespread in tropical Asia, from India to Taiwan, and south to Sulawesi, introduced to Hawaii and Africa (Drew and Romig 2013; Vargas et al. 2015). Reported from Bangladesh by Leblanc et al. (2013).

Bangladesh records. 11 specimens. DHAKA DIVISION: Dhaka District.

Male lure. Latilure (alpha-ionol and cade oil) (McQuate and Peck 2001).

Host plants. Recorded from 59 host taxa in 25 genera and 13 families (Allwood et al. 1999; McQuate and Liquido 2016). The family Solanaceae contains the major host species and *B. latifrons* is a significant pest of *Capsicum* and *Solanum* species (Drew and Romig 2013).

Notes. The parasitoid wasp *Diachasmimorpha longicaudata* (Ashmead, 1905) (Hymenoptera: Braconidae) was bred by Mahfuza Momen from larvae of *B. latifrons* infesting *Capsicum annuum* L. (Solanaceae), in June 2020, at the Atomic Agency Research Establishment compound in Savar, Dhaka.

***Bactrocera (Bactrocera) limbifera* (Bezzi, 1919)**

Figure 10

Distribution. Philippines (Bezzi 1919), Brunei, India (Andaman Island), Indonesia, Vietnam (Norrbom et al. 1999; Drew and Romig 2013), Laos (Leblanc et al. 2016), Bangladesh (**NEW COUNTRY RECORD**).

Bangladesh records. Two specimens. CHATTOGRAM DIVISION: Khagrachari Hill District, Matiranga Upazila, Alu Tila Hill, 25-vi-2019, cue-lure, M. Aftab Hossain. Specimens deposited in WFBM.

Male lure. Cue-lure.

Host plants. *Dracontomelon dao* (Blanco) Merr. and Rolfe (Anacardiaceae) (Hardy 1974), *Aglaia* sp. (Meliaceae) (Allwood et al. 1999), *Sterculia* sp. (Sterculiaceae) (Drew and Romig 2013).

***Bactrocera (Paratridacus) melania* (Hardy and Adachi, 1954)**

(= *Dacus aptatus* Hardy 1973)

Figure 11

Distribution. Singapore (Hardy and Adachi 1954), China (Norrbom et al. 1999), Indonesia, Malaysia (Peninsular), Thailand (Drew and Romig 2013), Bangladesh (**NEW COUNTRY RECORD**).

Bangladesh records. Two females and one male emerged from an infested fruit, intercepted in March 2020 from a traveler arriving from Bangladesh, by USDA-APHIS quarantine inspectors in the United States. Specimens deposited in UHIM.

Male lure. No known lure.

Host plants. *Garcinia dulcis* (Roxb.) Kurz, *G. xanthochymus* Hook. f. ex T. Anderson (Clusiaceae) (Allwood et al. 1999).

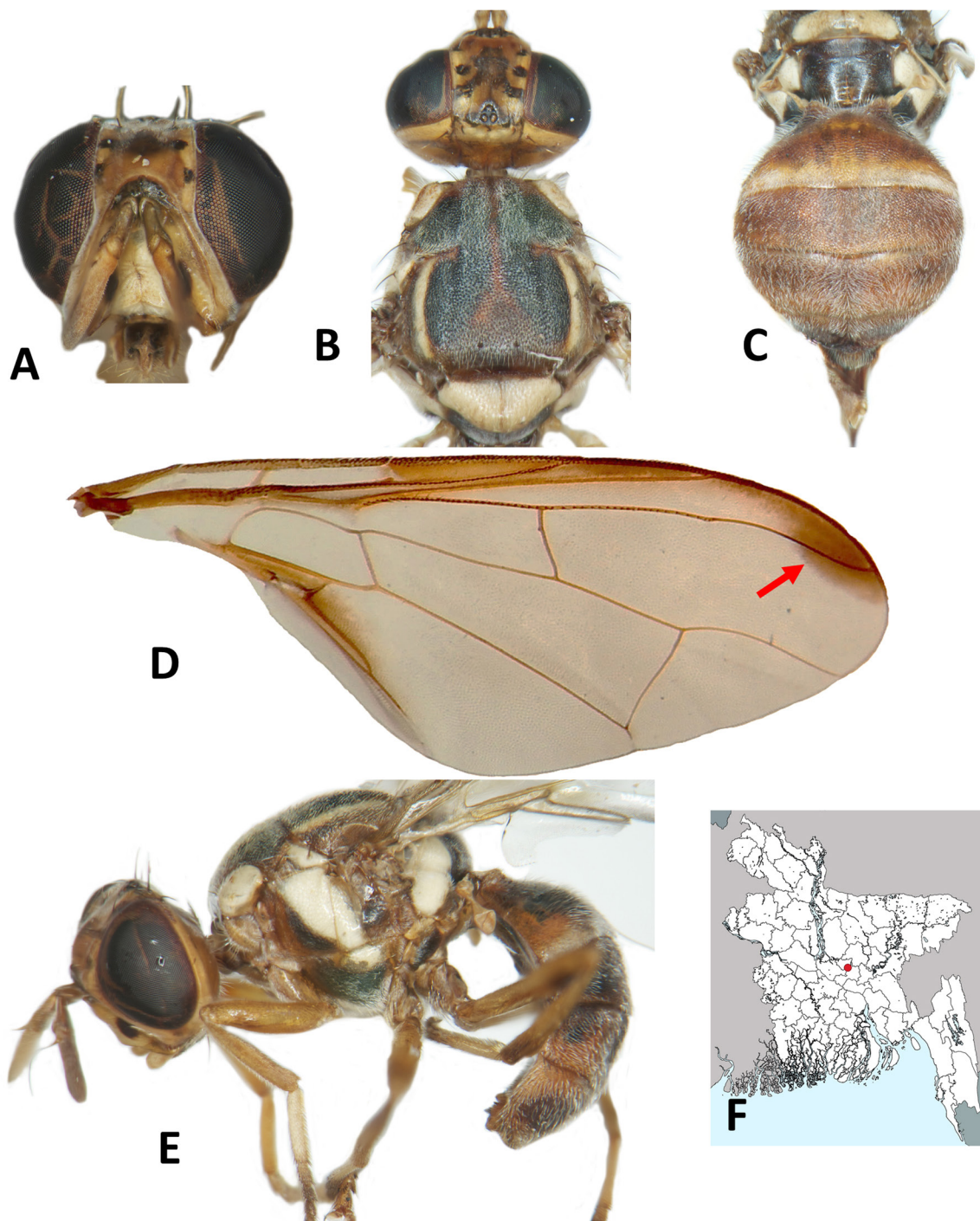


Figure 9. *Bactrocera* (*Bactrocera*) *latifrons* (Hendel). A) Head. B) Head and scutum. C) Abdomen, female. D) Wing. E) Lateral view, male. F) Distribution in Bangladesh.

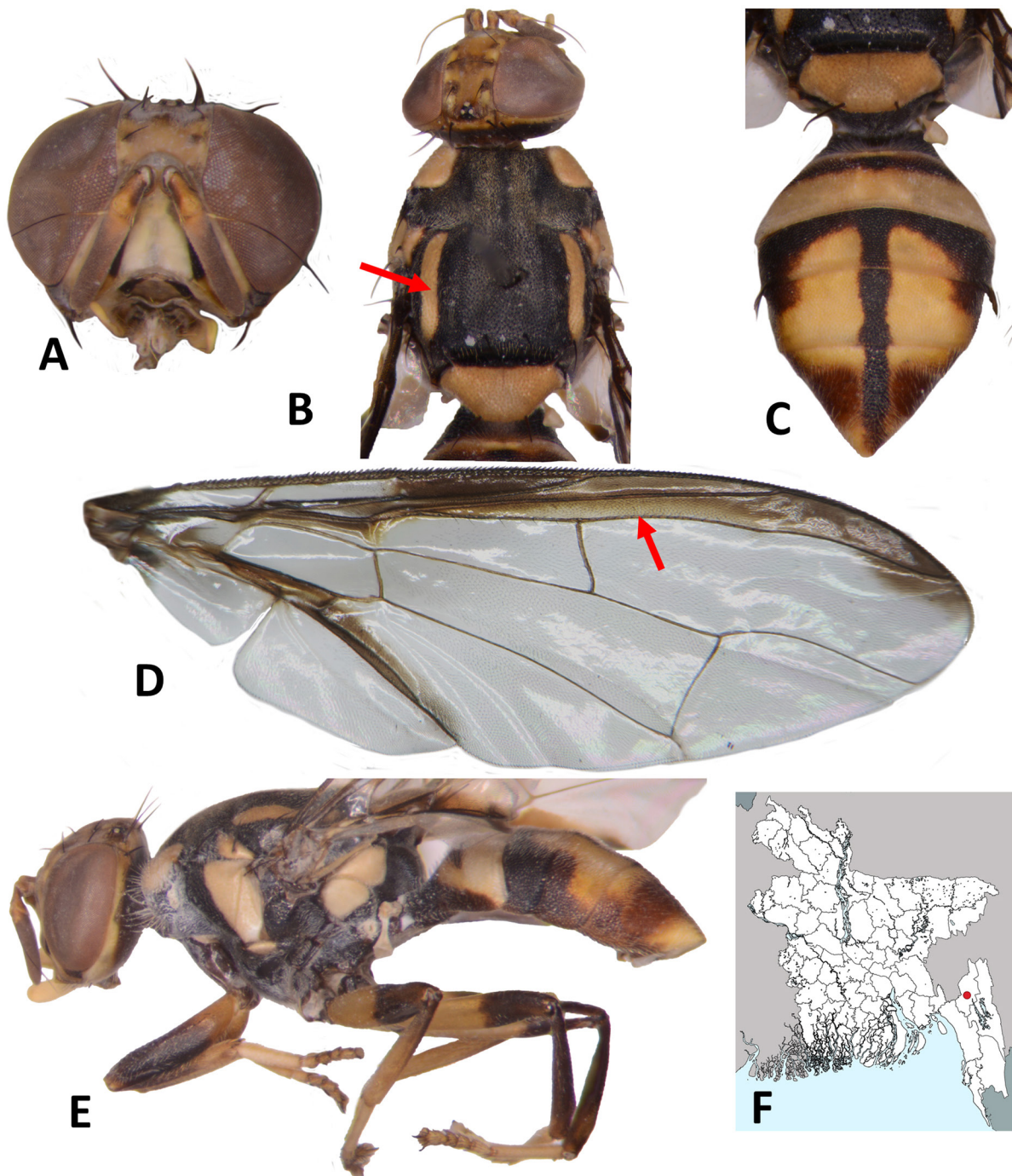


Figure 10. *Bactrocera* (*Bactrocera*) *limbifera* (Bezzi), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

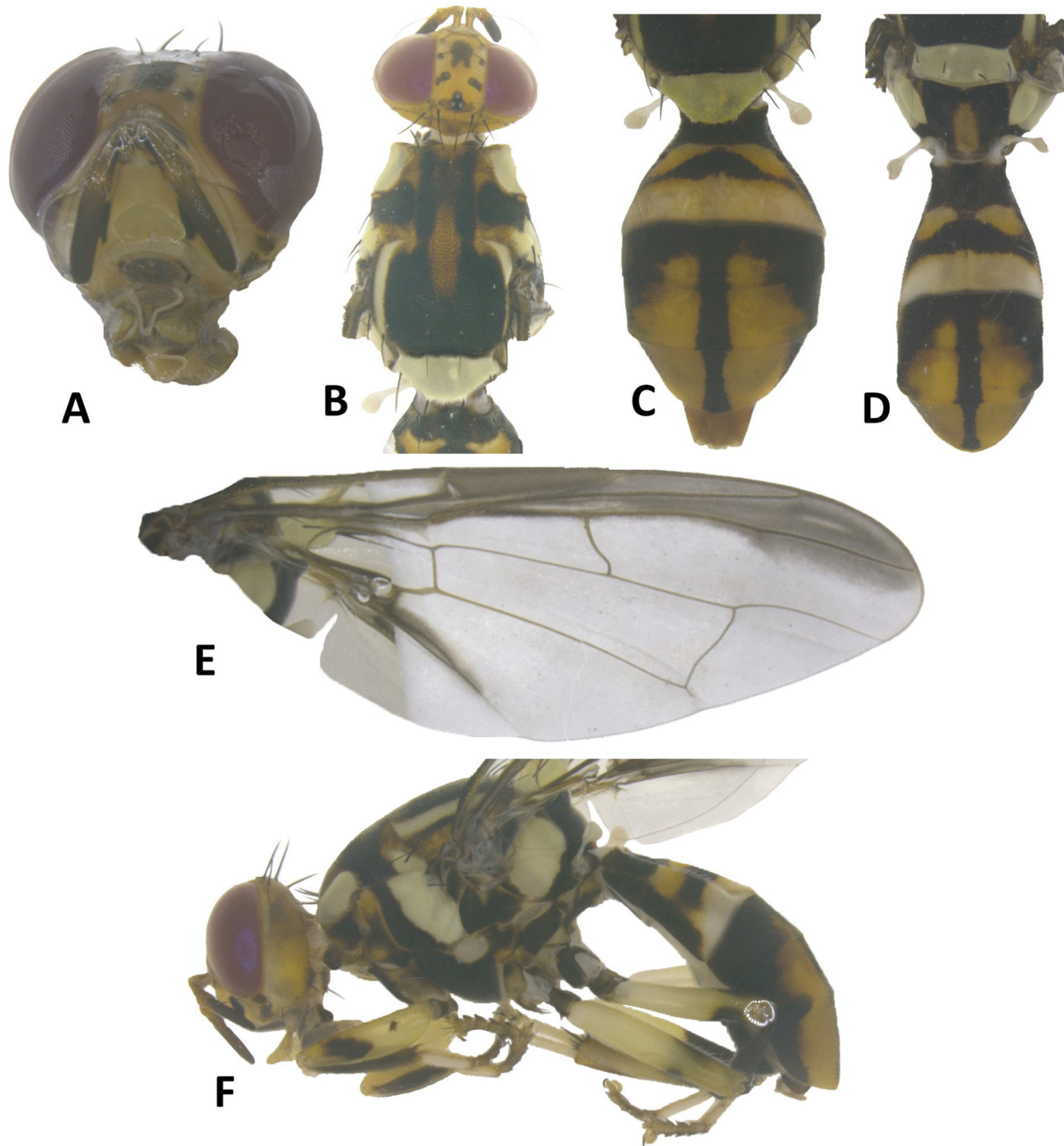


Figure 11. *Bactrocera (Paratridacus) melania* (Hardy and Adachi). A) Head B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E) Wing, male. F) Lateral view, male.

***Bactrocera (Bactrocera) nigrifacia* Zhang, Ji and Chen, 2011**

Figure 12

Distribution. China (Zhang et al. 2011), Thailand (Drew and Romig 2013), Bangladesh (Leblanc et al. 2014), Cambodia (Leblanc et al. 2016), Taiwan (Doorenweerd et al. 2019), Nepal (Leblanc et al. 2019a).

Bangladesh records. 276 specimens. BARISHAL DIVISION: Pirojpur District. CHATTOGRAM DIVISION: Bandarban Hill, Chattogram, Khagrachari Hill, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Faridpur, and Rajbari Districts. KHULNA DIVISION: Satkhira District. MYMENSINGH DIVISION: Mymensingh District. RAJSHAHI DIVISION: Chapai Nawabgonj and Natore Districts. RANGPUR DIVISION: Dinajpur, Kurigram, Lalmonirhat, Nilphamari, and Rangpur Districts. SYLHET DIVISION: Moulvibazar, Sunamgonj, and Sylhet Districts.

Male lure. Cue-lure.

Host plants. *Callicarpa arborea* Roxb. (Lamiaceae), *Capparis sepiaria* L. (Capparaceae), *Flueggea virosa* (Roxb. ex Willd.) Royle (Phyllanthaceae), *Zehneria wallichii* (Cucurbitaceae) (Drew and Romig 2013).

***Bactrocera (Bactrocera) nigrifemorata* Lin and Wang, 2011**

Figure 13

Distribution. China (Lin et al. 2011), Bangladesh (NEW COUNTRY RECORD).

Bangladesh records. One specimen. CHATTOGRAM DIVISION: Rangamati Hill District: Kaptai National Park (Bangchari Range), 25-vii-2019, cue-lure, M. Aftab Hossain. Specimen deposited in UHIM.

Male lure. Cue-lure (NEW ATTRACTANT RECORD).

Host plants. No known record.

***Bactrocera (Bactrocera) nigrofemoralis* White and Tsuruta, 2001**

Figure 14

Distribution. India, Pakistan, Sri Lanka (Tsuruta and White 2001), Bhutan (Drew et al. 2007), Bangladesh (Khan et al. 2015).

Bangladesh records. 12 specimens. DHAKA DIVISION: Dhaka and Gazipur Districts.

Male lure. Cue-lure.

Host plants. *Terminalia catappa* L. (Combretaceae) (Tsuruta and White 2001), *Citrus maxima* (Burm.) Merr. (Rutaceae), *Malpighia glabra* L. (Malpighiaceae), *Pouteria sapota* (Jacq.) H. E. Moore and Stearn (Sapotaceae), *Santalum album* L. (Santalaceae) (Drew and Romig 2013).

***Bactrocera (Parazeugodacus) pendleburyi* (Perkins, 1938)**

Figure 15

Distribution. Malaysia (Peninsular) (Perkins 1938), Thailand (Drew and Romig 2013), Vietnam (Leblanc et al. 2018a), Bangladesh (Leblanc et al. 2019b), Indonesia (Doorenweerd et al. 2020).

Bangladesh records. 16 specimens. CHATTOGRAM DIVISION: Chattogram, Cox's Bazar, Khagrachari Hill, and Rangamati Hill Districts.

Male lure. Zingerone.

Host plants. *Gmelina arborea* Roxb. (Lamiaceae), *Symplocos cochinchinensis* (Lour.) S. Moore, and *S. racemosa* Roxb. (Symplocaceae) (Allwood et al. 1999).

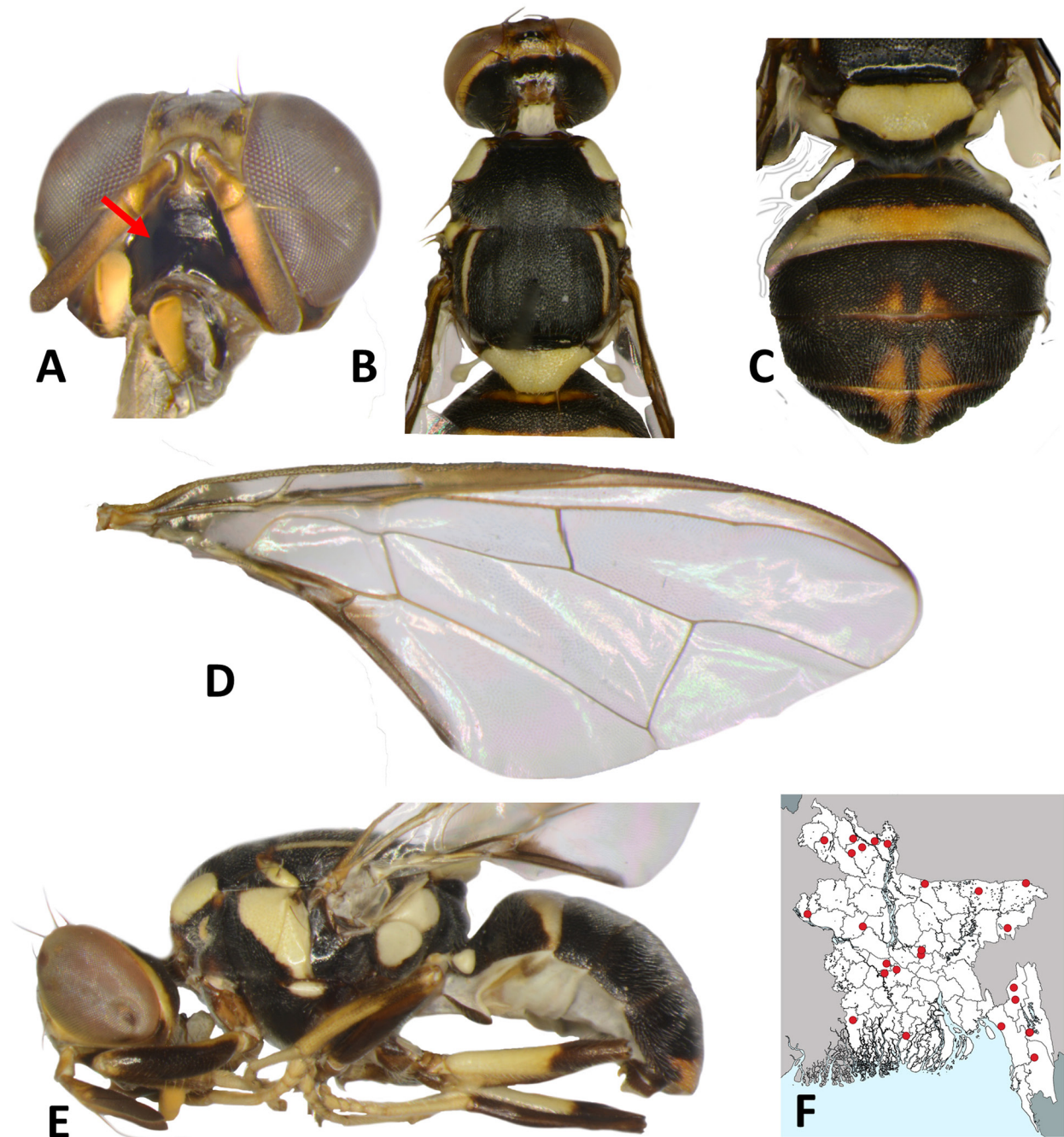


Figure 12. *Bactrocera (Bactrocera) nigrifacia* Zhang, Ji and Chen, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

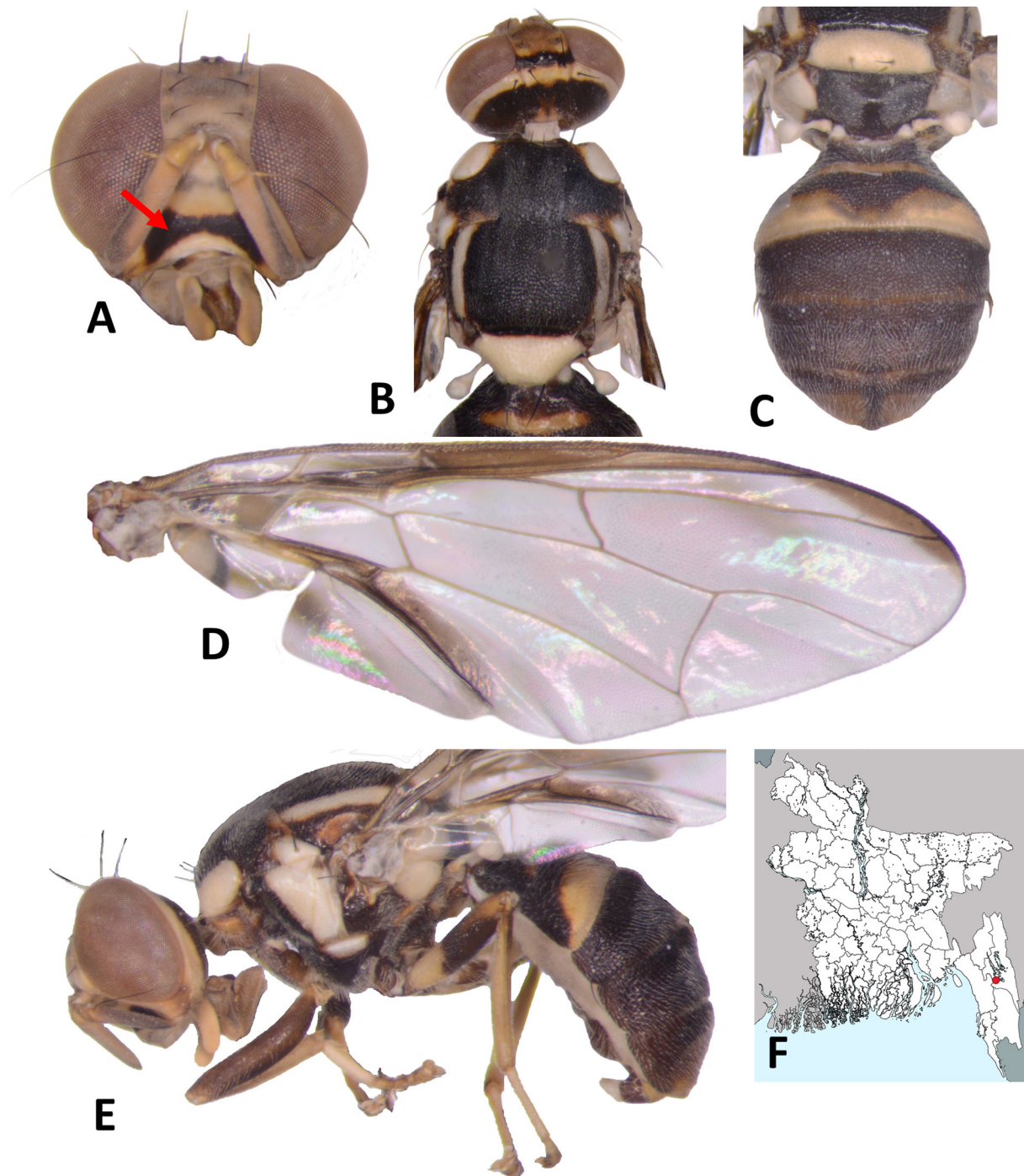


Figure 13. *Bactrocera (Bactrocera) nigrifemorata* Li and Wang, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

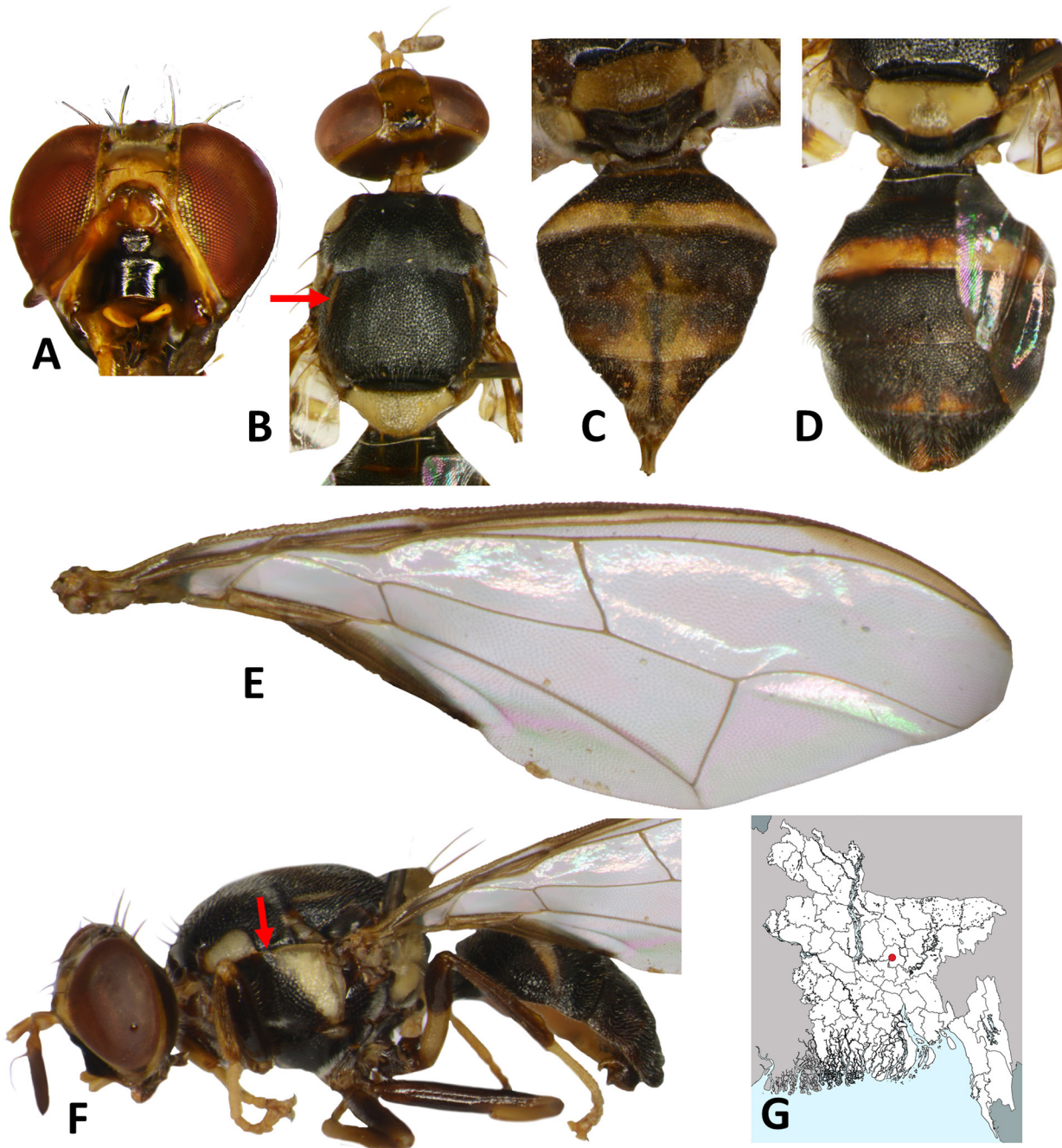


Figure 14. *Bactrocera (Bactrocera) nigrofemoralis* White and Tsuruta. A) Head. B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E) Wing. F) Lateral view, male. G) Distribution in Bangladesh.

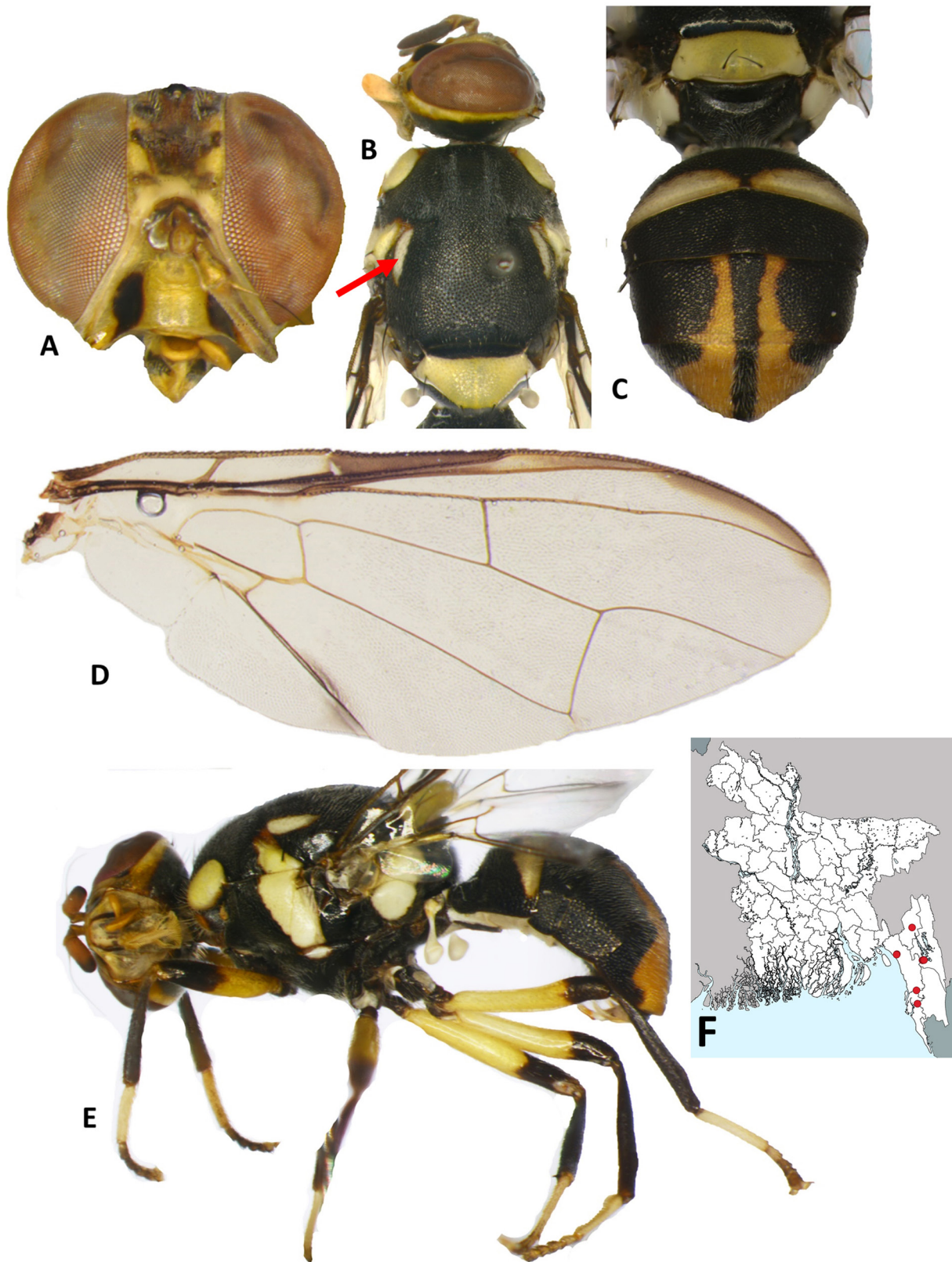


Figure 15. *Bactrocera* (*Parazeugodacus*) *pendleburyi* (Perkins), male (after Leblanc et al. 2018). **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view. **F)** Distribution in Bangladesh.

***Bactrocera (Bactrocera) propinqua* (Hardy and Adachi, 1954)**

Figure 16

Distribution. Malaysia (East) (Hardy and Adachi 1954), Cambodia, Malaysia (Peninsular), Singapore, Thailand, (Drew and Hancock, 1994), Vietnam (Drew and Romig 2013), Bangladesh (Leblanc et al. 2014, 2019b), Laos, China (Leblanc et al. 2016), Indonesia (Doorenweerd et al. 2020).

Bangladesh records. 62 specimens. CHATTOGRAM DIVISION: Bandarban Hill, Chattogram, Cox's Bazar, Khagrachari Hill, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Gazipur, and Tangail Districts. SYLHET DIVISION: Moulvibazar and Sylhet Districts.

Male lure. Cue-lure.

Host plants. *Garcinia bancana* Miq. (Drew and Hancock 1994), *G. atroviridis* Griff. ex T. Anderson, *G. costata* Hemsl. ex King, *G. cowa* Roxb. ex Choisy, *G. forbesii* King, *G. schomburgkiana* Pierre, *G. xanthochymus* Hook.f. ex T. Anderson (Clusiaceae) (Allwood et al. 1999).

Note. Intraspecific variation in this species has been documented by Leblanc et al. (2015b).

***Bactrocera (Bactrocera) rubigina* (Wang and Zhao, 1989)**

Figure 17

Distribution. China (Wang and Zhao 1989), Bhutan (Drew et al. 2007), Thailand, Vietnam (Drew and Romig 2013), India (David et al. 2017), Taiwan (Doorenweerd et al. 2019), Sri Lanka (Leblanc et al. 2018b), Bangladesh (Leblanc et al. 2013), Nepal (Leblanc et al. 2019a).

Bangladesh records. 9,030 specimens. CHATTOGRAM DIVISION: Bandarban Hill, Chandpur, Chattogram, Cox's Bazar, Khagrachari Hill, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Gazipur, and Tangail Districts. RANGPUR DIVISION: Panchagarh District. SYLHET DIVISION: Habiganj, Moulvibazar, and Sylhet Districts.

Male lure. Cue-lure, zingerone.

Host plants. Liang et al. (1993) recorded *Litsea verticillata* Hance (Lauraceae) as host in China. Leblanc et al. (2015b) noted that *B. rubigina* was genetically indistinguishable from *B. melastomatos* Drew and Hancock and *B. osbeckiae* Drew and Hancock, both bred from flowers of *Melastoma* spp. (Melastomataceae). Attempts to breed *B. rubigina* from these flowers in Bangladesh have so far been unsuccessful.

Notes. In Bangladesh, Hossain et al. (2019) studied the seasonal abundance of *B. rubigina* in relation to abiotic factors. Intraspecific variation in this species has been documented by Leblanc et al. (2015b).

***Bactrocera (Bactrocera) syzygii* White and Tsuruta, 2001**

Figure 18

Distribution. Sri Lanka (Tsuruta and White 2001), India (David et al. 2017), Vietnam (Leblanc et al. 2018a), Bangladesh (Leblanc et al. 2019b), Nepal (Leblanc et al. 2019a), Indonesia (Doorenweerd et al. 2020).

Bangladesh records. 342 specimens. CHATTOGRAM DIVISION: Bandarban Hill, Chattogram, Cox's Bazar, Khagrachari Hill, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka and Tangail Districts. RANGPUR DIVISION: Dinajpur District. SYLHET DIVISION: Sylhet District.

Male lure. Zingerone.

Host plants. *Syzygium jambos* (L.) Alston (Myrtaceae) (Tsuruta and White 2001).

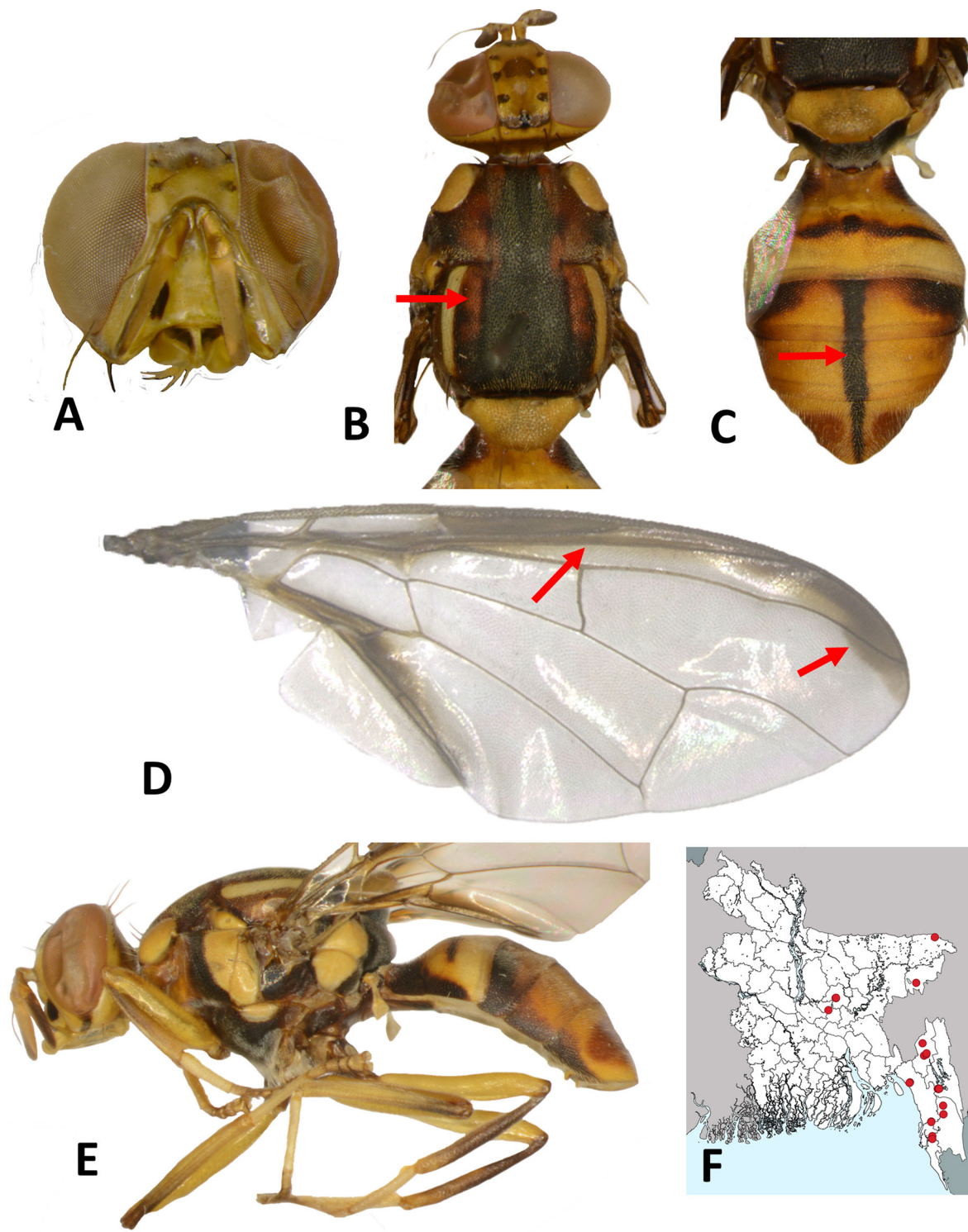


Figure 16. *Bactrocera (Bactrocera) propinqua* (Hardy and Adachi), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

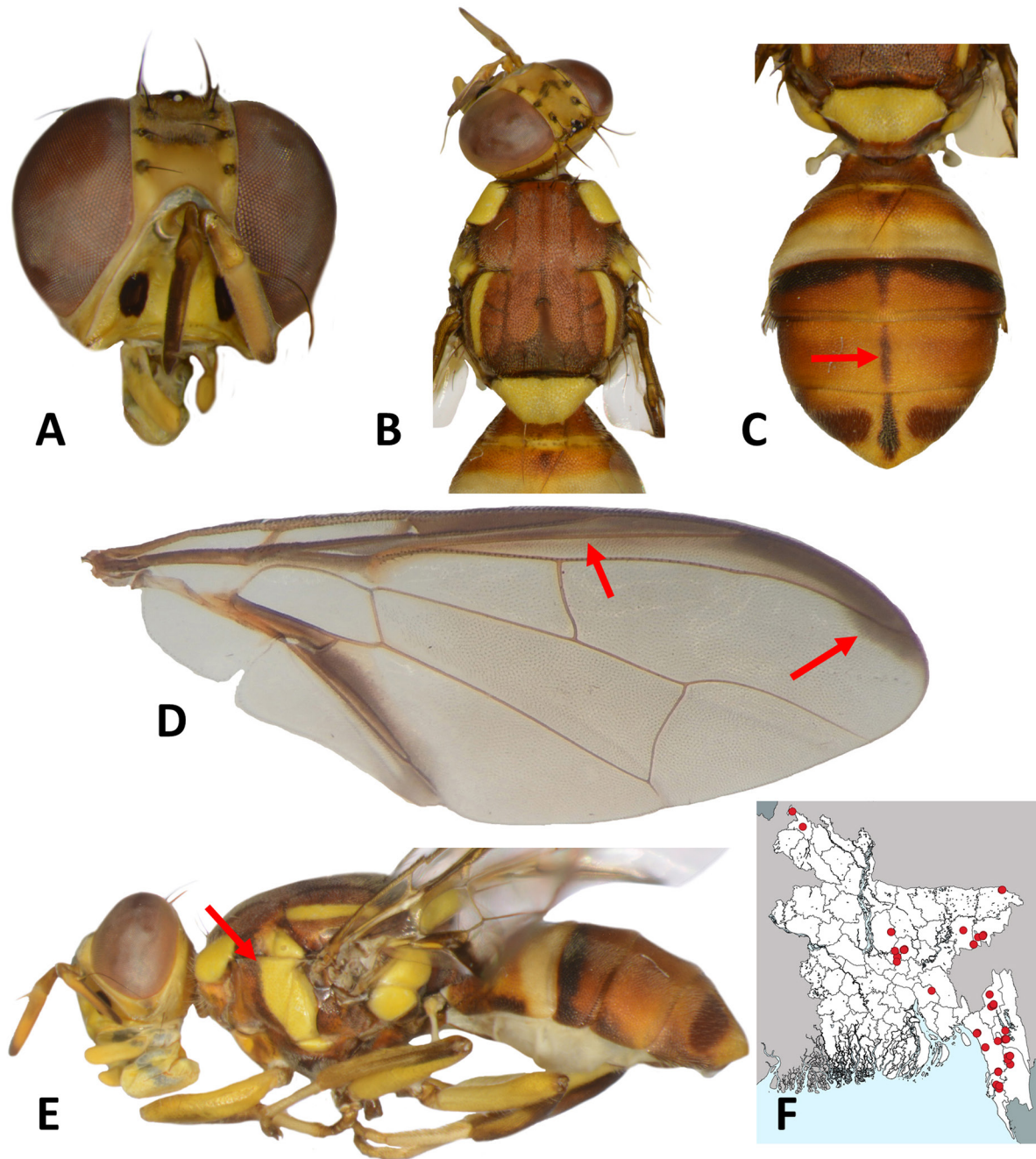


Figure 17. *Bactrocera (Bactrocera) rubigina* (Wang and Zhao). A) Head. B) Head and scutum. C) Abdomen. D) Wing (after Leblanc et al. 2014). E) Lateral view. F) Distribution in Bangladesh.

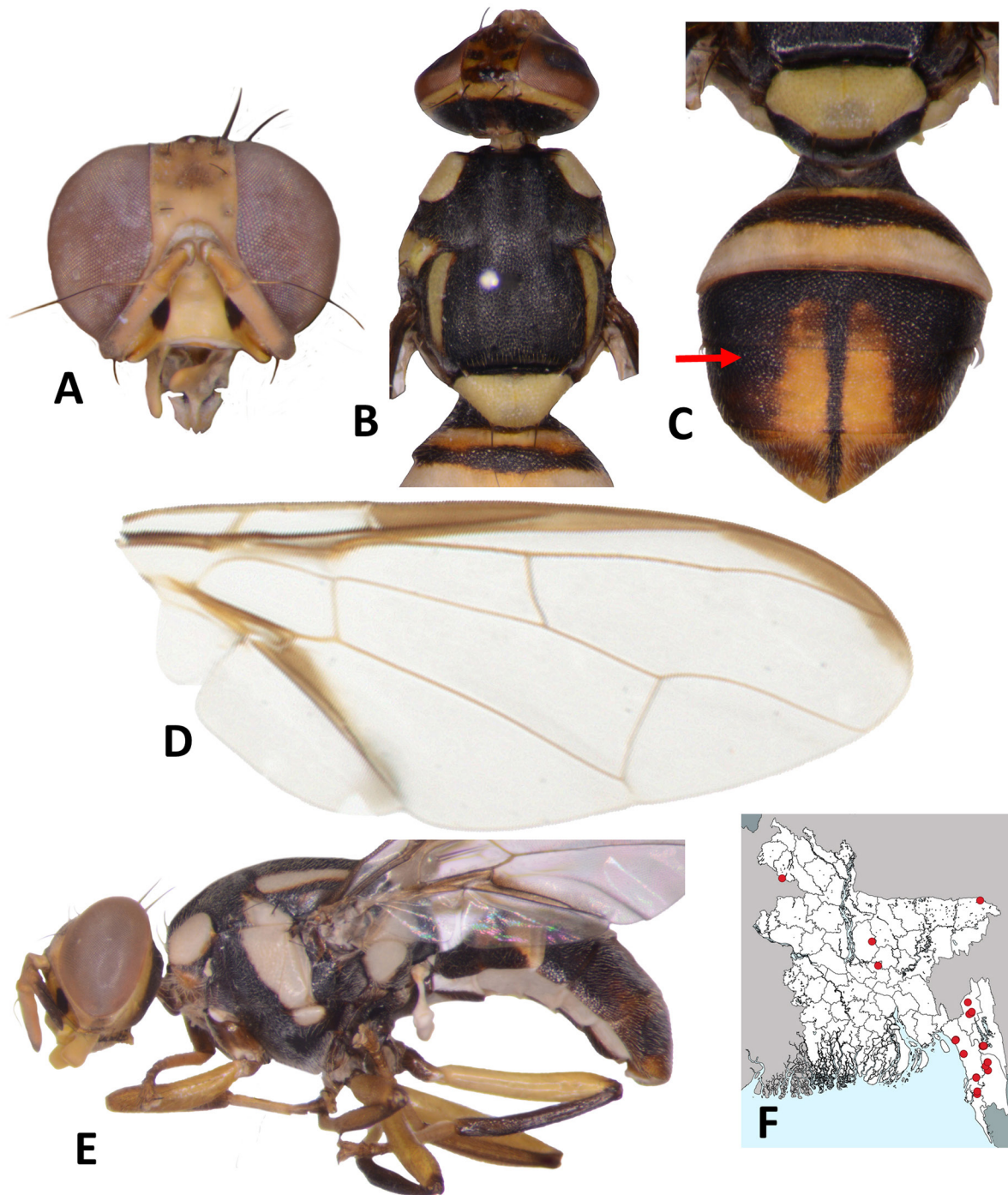


Figure 18. *Bactrocera (Bactrocera) syzygii* White and Tsuruta, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

***Bactrocera (Bactrocera) tuberculata* (Bezzi, 1916)**

Figure 19

Distribution. Myanmar (Bezzi 1916), Thailand, Vietnam (Hardy 1973), Bhutan (Drew et al. 2007), China (Norrbom et al. 1999), Bangladesh (Leblanc et al. 2014), India (David et al. 2017), Nepal (Leblanc et al. 2019a).

Bangladesh records. 76 specimens. CHATTOGRAM DIVISION: Bandarban Hill, Chattogram Hill, Cox's Bazar, Khagrachari Hill, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka District. SYLHET DIVISION: Moulvibazar and Sylhet Districts.

Male lure. Methyl eugenol.

Host plants. A moderate pest of cultivated fruit, bred from 11 host species in eight families, including mango, papaya, and plum (Allwood et al. 1999).

***Bactrocera (Bactrocera) zonata* (Saunders, 1842)**

(= *Rivellia persicae* Bigot, 1890, *Dacus ferrugineus* var. *mangiferae* Cotes, 1893)

Figure 20

Distribution. Widespread in tropical Asia, from Pakistan east to Vietnam, but not in southern Thailand, Malaysia, Indonesia (Drew and Romig 2013). Introduced to Mauritius, Réunion, North Africa and the Middle East.

Bangladesh records. 853 specimens. CHATTOGRAM DIVISION: Bandarban Hill, Chattogram, and Khagrachari Hill Districts. DHAKA DIVISION: Dhaka, Faridpur, Gazipur, Madaripur, and Rajbari Districts. KHULNA DIVISION: Bagerhat, Chuadanga, Jashore, Jhenaidah, Khulna, and Satkhira Districts. MYMENSINGH DIVISION: Mymensingh District. RAJSHAHI DIVISION: Chapai Nawabgonj, Naogaon, Natore, and Rajshahi Districts. RANGPUR DIVISION: Dinajpur, Lalmonirhat, Nilphamari, and Rangpur Districts. SYLHET DIVISION: Sunamgonj District.

Male lure. Methyl eugenol.

Host plants. A broadly polyphagous fruit pest bred from 54 host taxa in 38 genera and 23 families (Allwood et al. 1999; Culliney et al. 2017). Bred from mango in Bangladesh (Kabir et al. 1991).

Note. In Bangladesh, Hossain et al. (2017, 2019) studied the seasonal abundance of *B. zonata* in relation to abiotic factors for making control decisions.

***Dacus (Didacus) ciliatus* Loew, 1862**

(= *Dacus sexmaculatus* Walker 1871, *Dacus sigmoides* Coquillett 1901, *Dacus brevistylus* Bezzi 1908, *Dacus apoxanthus* var. *decolor* Bezzi 1924, *Tridacus mallyi* Munro 1925, *Dacus insistens* Curran 1927, *Dacus coccinae* Premata and Singh 1987)

Figure 21

Distribution. Widespread in Africa, introduced in Mauritius, Réunion, the Middle East to the Indian subcontinent and Sri Lanka (Drew and Romig 2013). First recorded in Bangladesh by Akhtaruzzaman et al. (1999a).

Bangladesh records. Bred from cucumber in Sylhet by Akhtaruzzaman et al. (1999a). It was not collected in our surveys, that were largely based on trapping using male lures.

Male lure. No known lure.

Host plants. Bred from 64 host species in 25 genera and 10 families, but predominantly infests Cucurbitaceae (McQuate et al. 2018). Bred from cucumber in Bangladesh (Akhtaruzzaman et al. (1999a).

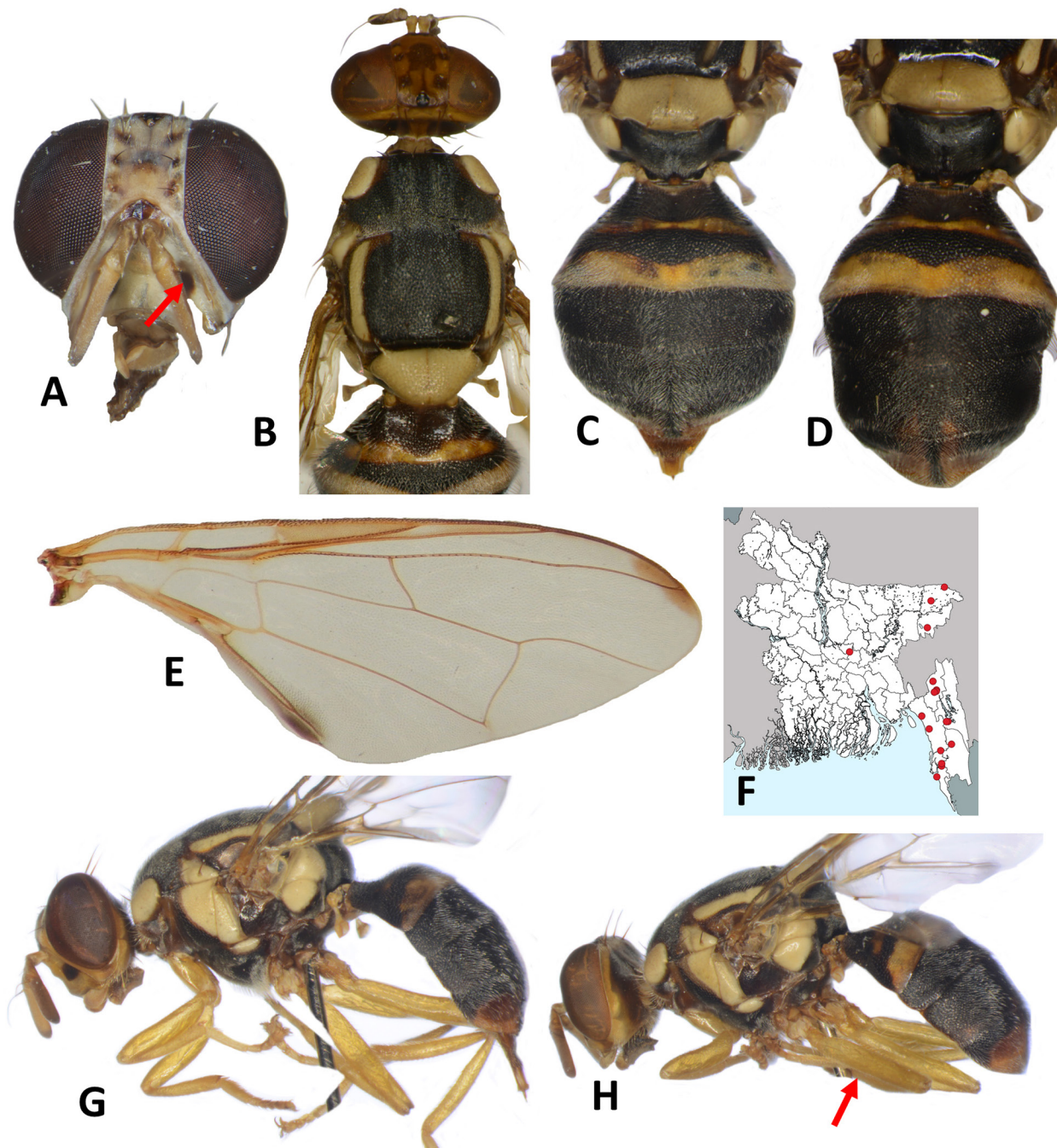


Figure 19. *Bactrocera (Bactrocera) tuberculata* (Bezzi). A) Head. B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E) Wing (after Leblanc et al. 2014). F) Distribution in Bangladesh. G) Lateral view, female. H) Lateral view, male.

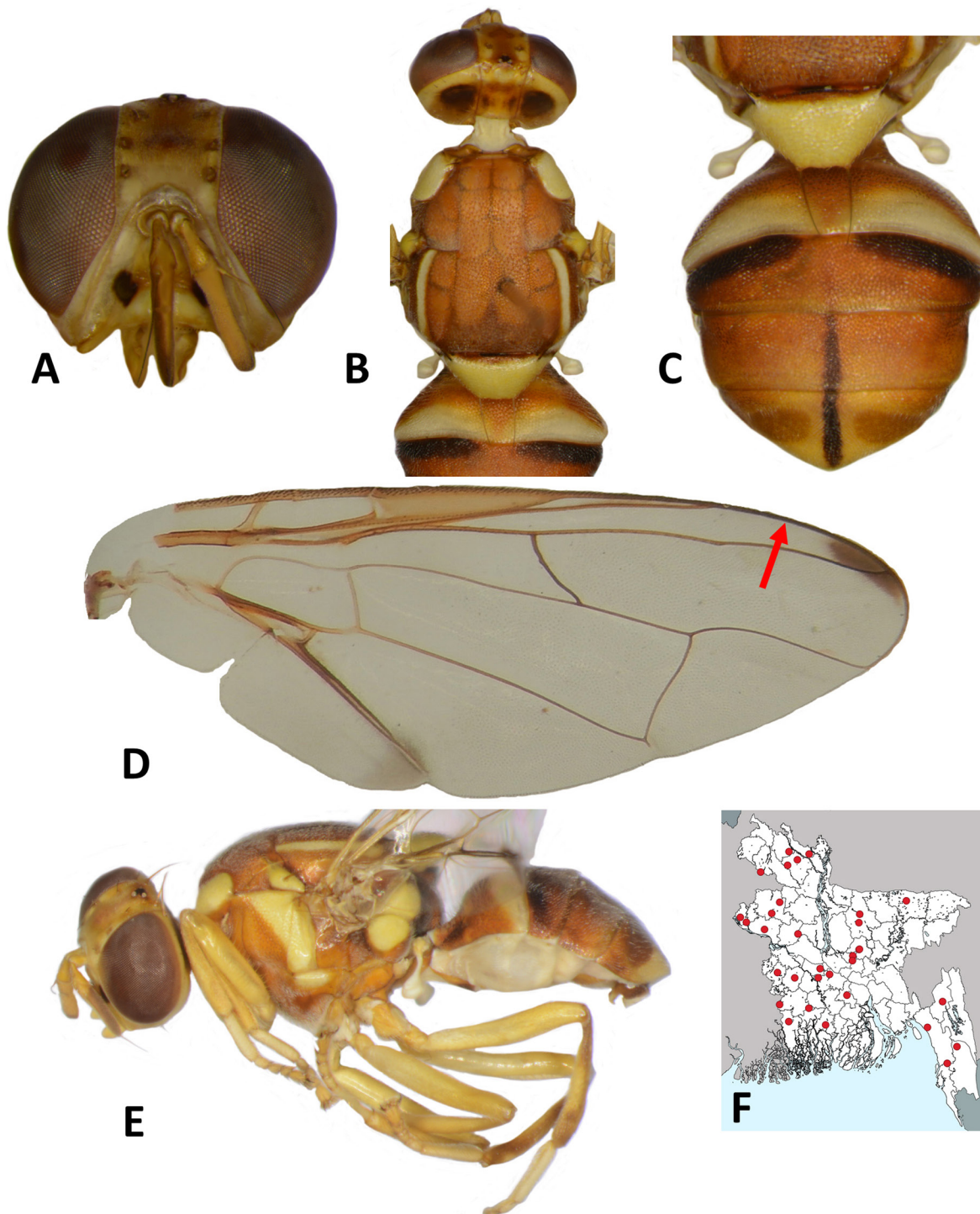


Figure 20. *Bactrocera* (*Bactrocera*) *zonata* (Saunders), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

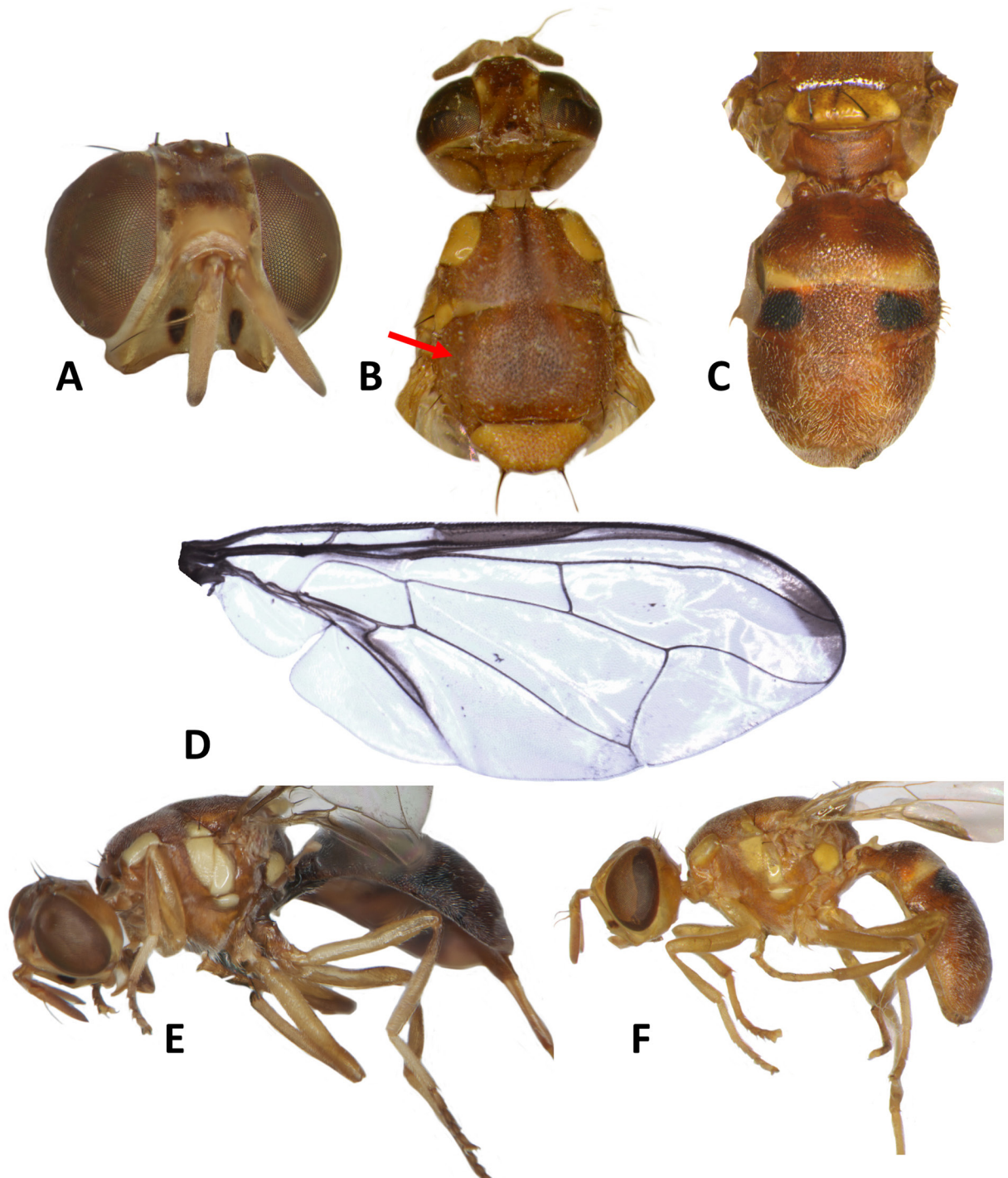


Figure 21. *Dacus (Didacus) ciliatus* Loew. A) Head. B) Head and scutum. C) Abdomen, male. D) Wing (after Leblanc et al. 2014). E) Lateral view, female. F) Lateral view, male.

***Dacus (Mellesis) jacobii* David and Sachin, 2020**

Figure 22

Distribution. India (David et al. 2020), Bangladesh (NEW COUNTRY RECORD).**Bangladesh records.** 7 specimens. CHATTOGRAM DIVISION: Rangamati Hill District, Kaptai National Park (Baluchar Range), 24-vii-2019, zingerone, M. Aftab Hossain. Rangamati Hill District, Kaptai National Park (Bangchari Range), 25-vii-2019, zingerone, M. Aftab Hossain. Specimens deposited in WFBM and UHIM.**Male lure.** Zingerone.**Host plants.** No known record.***Dacus (Callantra) longicornis* (Wiedemann, 1830)**(= *Callantra smieroides* Walker, 1860, *Dacus vespoides* Bezzi, 1909, *Mellesis destillatoria* Bezzi, 1916, *Mellesis eumenoides* Bezzi, 1916, *Mellesis bioculata* Bezzi, 1919, *Callantra unifasciatus* Hardy, 1982, *Callantra variegata* Wang, 1990)

Figure 23

Distribution. Widespread in tropical Asia, from India east to Vietnam and south to Malaysia, Indonesia and the Philippines (Drew et al. 1998; Agarwal and Sueyoshi 2005; Drew and Romig 2013). Recorded from Bangladesh by Khan (2009), and Nepal by Adhikari et al. (2018).**Bangladesh records.** 778 specimens. BARISHAL DIVISION: Barishal, Bhola District, and Pirojpur Districts. CHATTOGRAM DIVISION: Bandarban Hill, Bramhanbaria, Chandpur, Chattogram, Cox's Bazar, Cumilla, Feni, Khagrachari Hill, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Faridpur, Gazipur, Gopalganj, Munshiganj, Narayanganj, and Tangail Districts. KHULNA DIVISION: Jhenaidah and Satkhira Districts. MYMENSINGH DIVISION: Mymensingh District. RAJSHAHI DIVISION: Chapai, Pabna, and Sirajganj Districts. RANGPUR DIVISION: Dinajpur, Lalmonirhat, Panchagarh, and Thakurgaon Districts. SYLHET DIVISION: Habiganj, Moulvibazar, and Sylhet Districts.**Male lure.** Cue-lure.**Host plants.** A moderate pest of cucurbit bred from fruits of *Luffa acutangula* (L.) Roxb., *L. cylindrica* (L.) M. Roem., *Trichosanthes cucumerina* L., and *Zehneria wallichii* (C.B. Clarke) C. Jeffrey (Cucurbitaceae) (Allwood et al. 1999).**Notes.** In Bangladesh, Hossain et al. (2019) studied the seasonal abundance of *D. longicornis* in relation to abiotic factors and host plants.***Zeugodacus (Asiadacus) apicalis* (Meijere, 1911)**(= *Dacus modicus* Hardy, 1973, *Dacus dianensis* Wang and Zhao, 1989, *Dacus nadanus* Chao and Lin, 1993)

Figure 24

Distribution. Indonesia (Mejeire 1911), Brunei, China, Malaysia, Thailand, Vietnam (White and Hancock 1997; Drew and Romig 2013), Bangladesh (Leblanc et al. 2019b).**Bangladesh records.** One specimen. CHATTOGRAM DIVISION: Chattogram District.**Male lure.** Cue-lure.**Host plants.** Bred from flowers of *Trichosanthes wawraei* Cogn. (Cucurbitaceae) (Allwood et al. 1999).

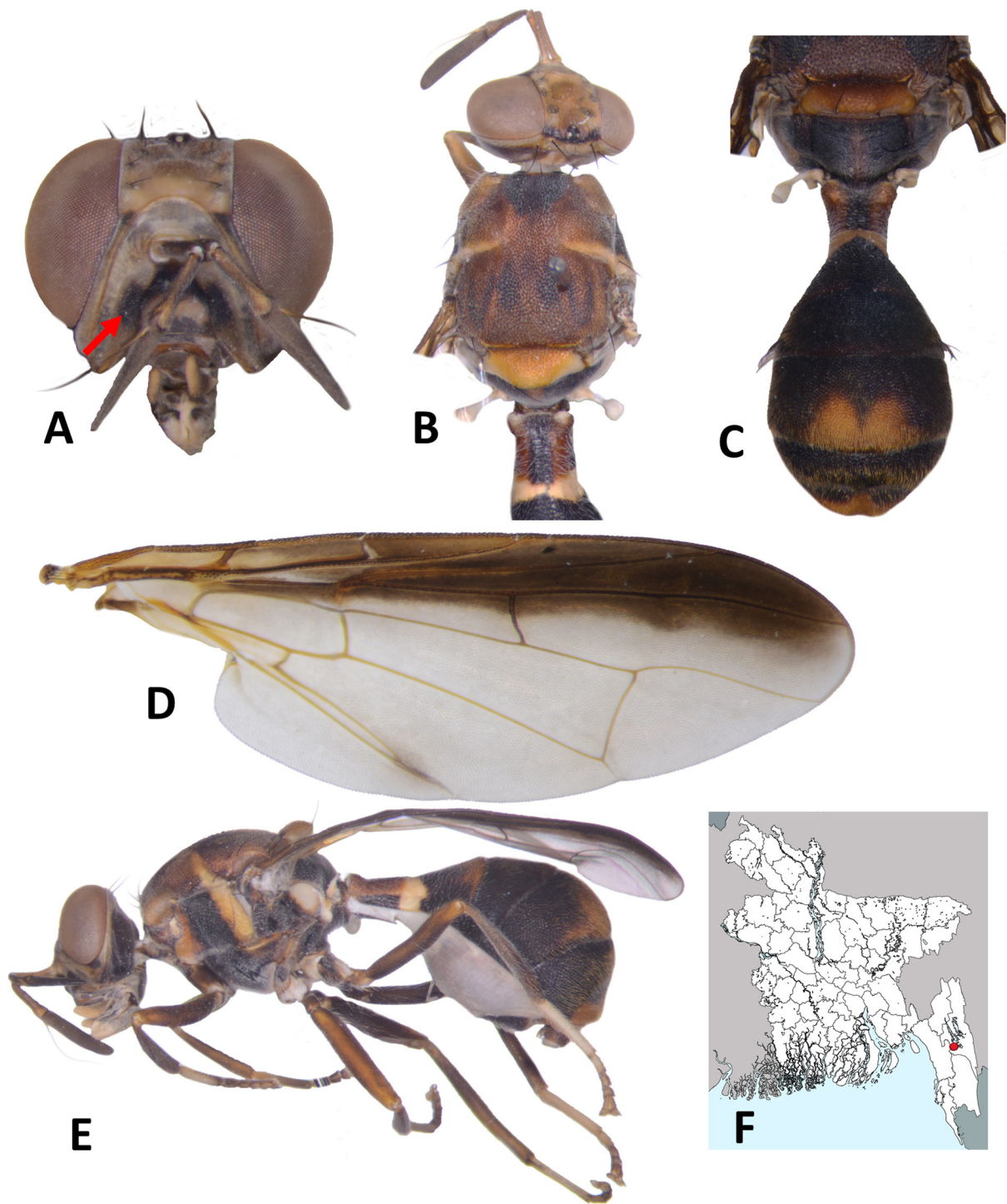


Figure 22. *Dacus (Mellesis) jacobi* David and Sachin, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

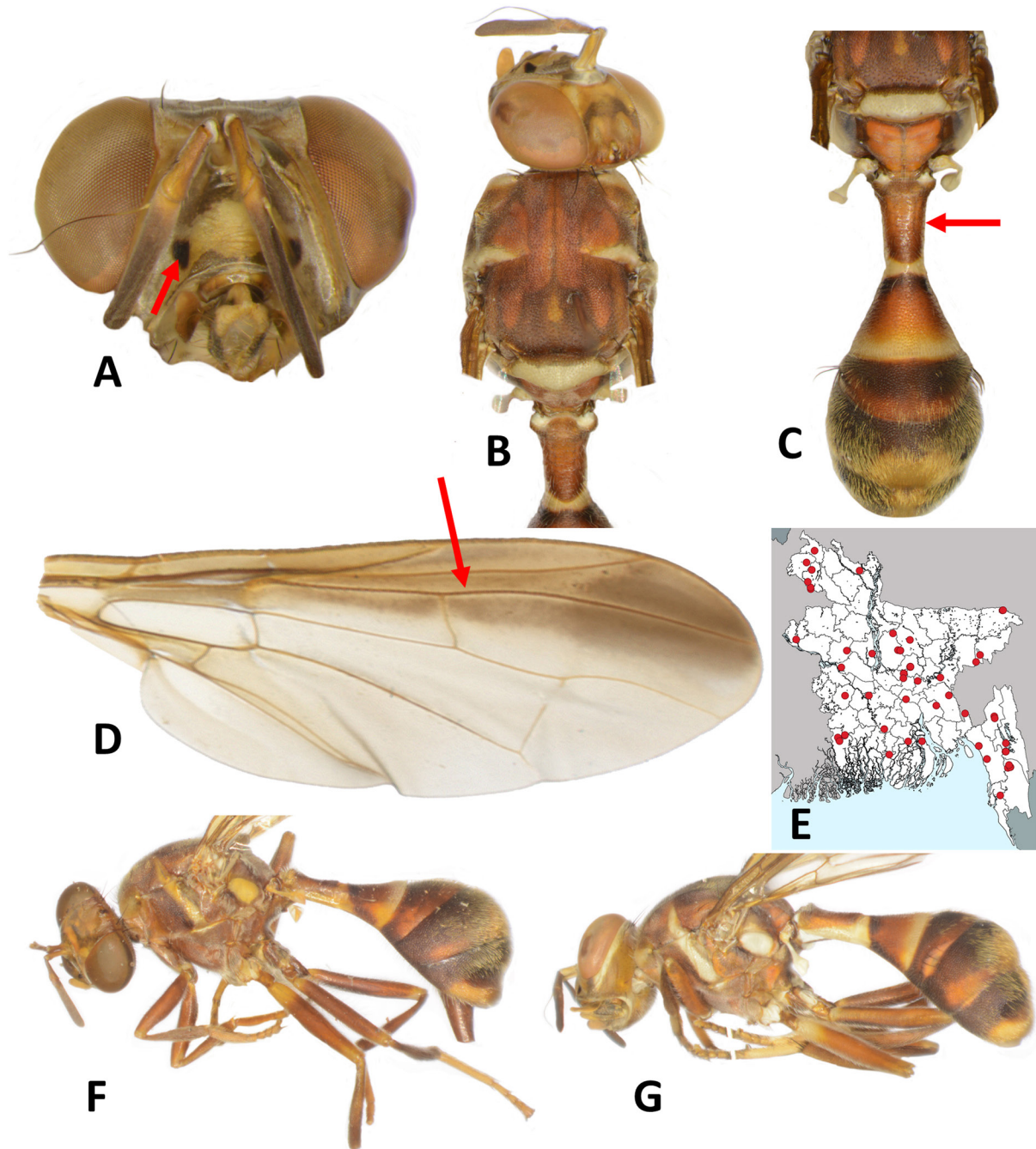


Figure 23. *Dacus (Callantra) longicornis* Wiedemann. A) Head. B) Head and scutum. C) Abdomen, male. D) Wing. E) Distribution in Bangladesh. F) Lateral view, female. G) Lateral view, male.

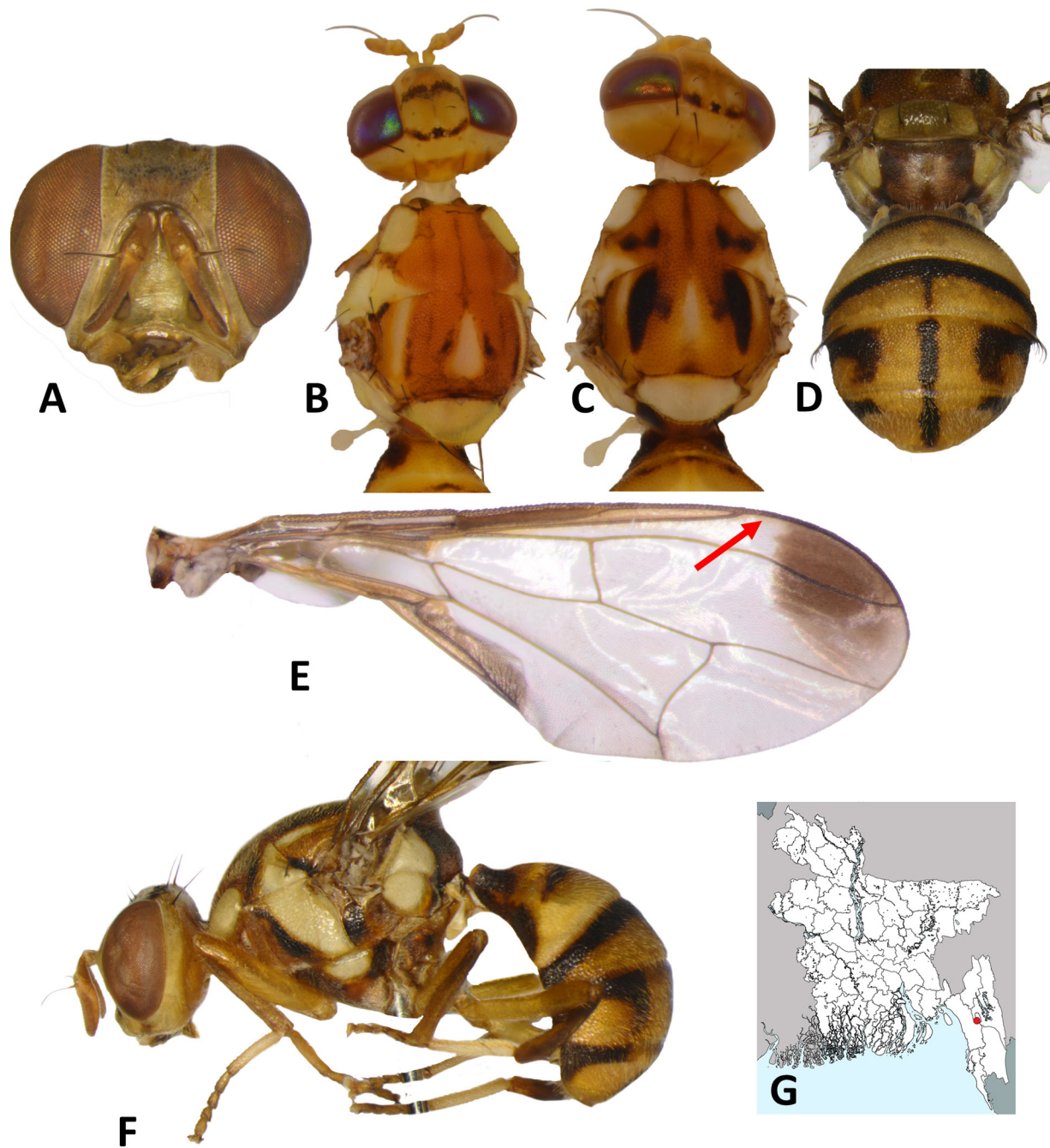


Figure 24. *Zeugodacus (Asiadacus) apicalis* (Meijere), male. A) Head. B-C) Head and scutum. D) Abdomen. E) Wing. F) Lateral view. G) Distribution in Bangladesh.

***Zeugodacus (Zeugodacus) atrifacies* Perkins, 1938**

(= *Dacus parater* Chao and Lin, 1993)

Figure 25

Distribution. Malaysia (Peninsular) (Perkins 1938), Thailand (White and Hancock 1997), Bhutan, China, Malaysia (East), Vietnam (Drew and Romig 2013), Laos (Leblanc et al. 2016), Bangladesh (Leblanc et al. 2019b).

Bangladesh records. 29 specimens. CHATTOGRAM DIVISION: Chattogram, Khagrachari Hill, and Rangamati Hill Districts.

Male lure. Cue-lure.

Host plants. No known record.

***Zeugodacus (Zeugodacus) caudatus* (Fabricius, 1805)**

(= *Bactrocera maculipennis* Doleschall, 1856)

Figure 26

Distribution. Brunei, China, India, Indonesia, Malaysia (Peninsular, East), Myanmar, Nepal, Sri Lanka, Taiwan, Thailand, Vietnam (Agarwal and Sueyoshi 2005, Drew and Romig 2013), Bangladesh (Leblanc et al. 2013), Cambodia (Leblanc et al. 2016).

Bangladesh records. 120 specimens. DHAKA DIVISION: Dhaka, Gazipur, and Tangail Districts. MYMENSINGH DIVISION: Mymensingh and Sherpur Districts. RAJSHAHI DIVISION: Bogura, Chapai Nawabgonj, Naogaon, Natore, and Pabna Districts. RANGPUR DIVISION: Dinajpur, Nilphamari, Panchagarh, Rangpur, and Thakurgaon Districts.

Male lure. Cue-lure.

Host plants. Bred from male flowers of *Cucurbita moschata* Duchesne (Cucurbitaceae) (Allwood et al. 1999). Liquido and Hanlin (2021) reported six host taxa in five genera in the families Cucurbitaceae and Solanaceae, as well as unverified records for additional plants.

***Zeugodacus (Parasinodacus) cilifer* (Hendel, 1912)**

(= *Dacus tenuifinis* Hardy, 1983)

Figure 27

Distribution. Taiwan (Hendel 1912), China, Laos, Thailand, Vietnam (Norrbon et al. 1999), Malaysia (Peninsular), Indonesia (Drew and Romig 2013), Bangladesh (Leblanc et al. 2013).

Bangladesh records. Two specimens. CHATTOGRAM DIVISION: Bandarban Hill District. DHAKA DIVISION: Dhaka District.

Male lure. Cue-lure.

Host plants. Bred from male flowers of *Thladiantha hookeri* C.B. Clarke (Cucurbitaceae) (Allwood et al. 1999).

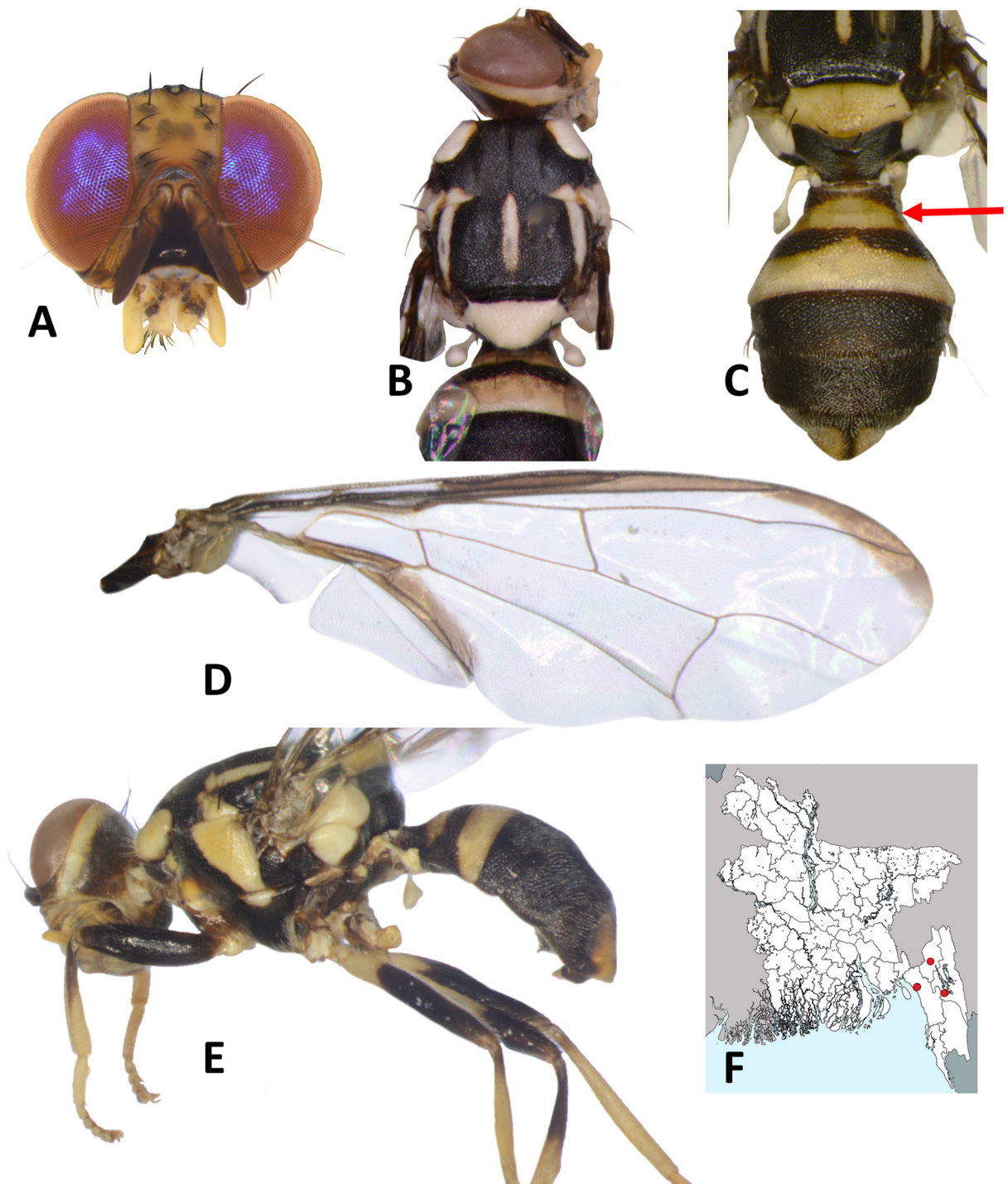


Figure 25. *Zeugodacus (Zeugodacus) atrifacies* Perkins, male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

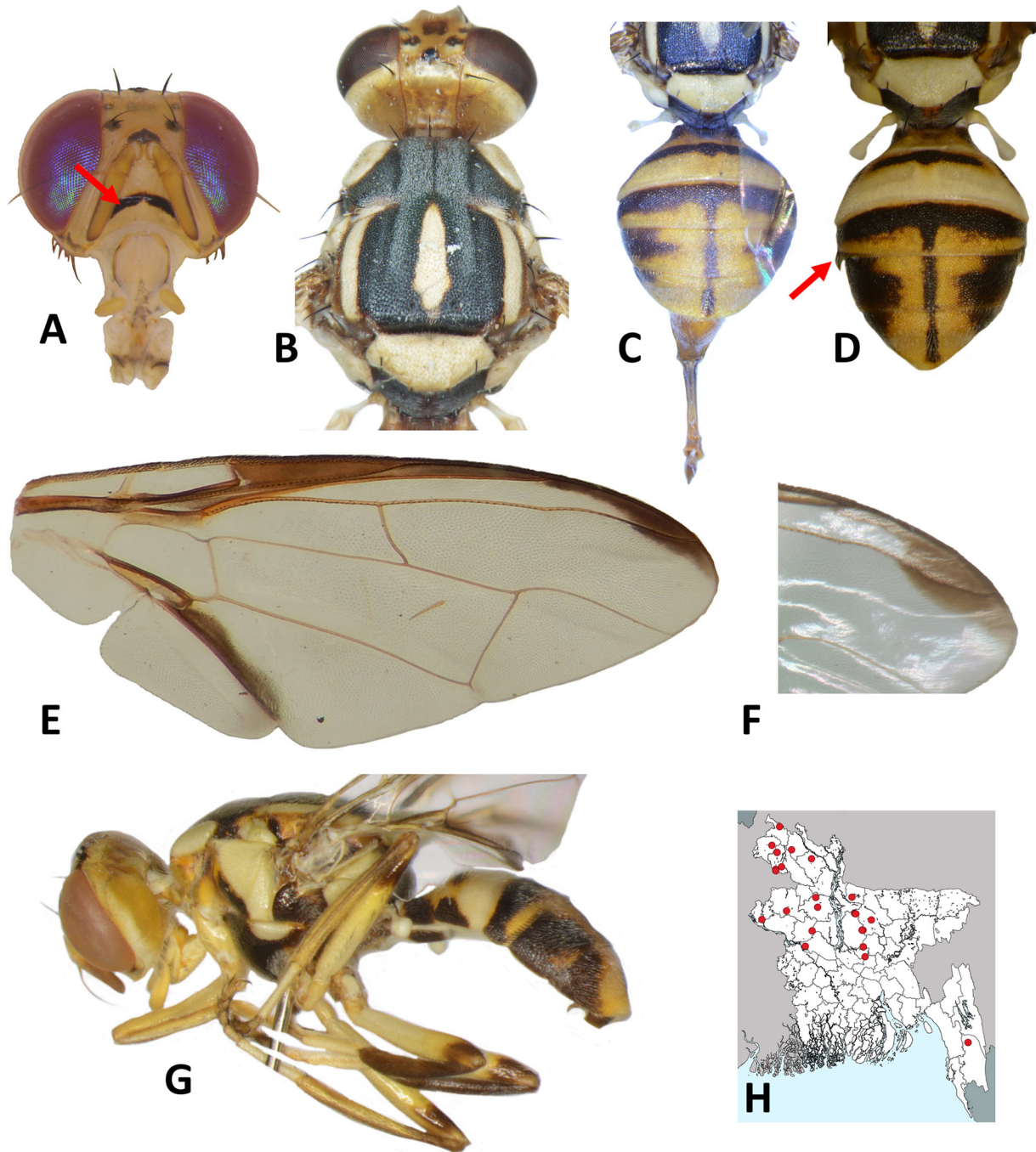


Figure 26. *Zeugodacus (Zeugodacus) caudatus* (Fabricius). A) Head. B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E) Wing (after Leblanc et al. 2014). F) Wing apex, variant. G) Lateral view, male. H) Distribution in Bangladesh.

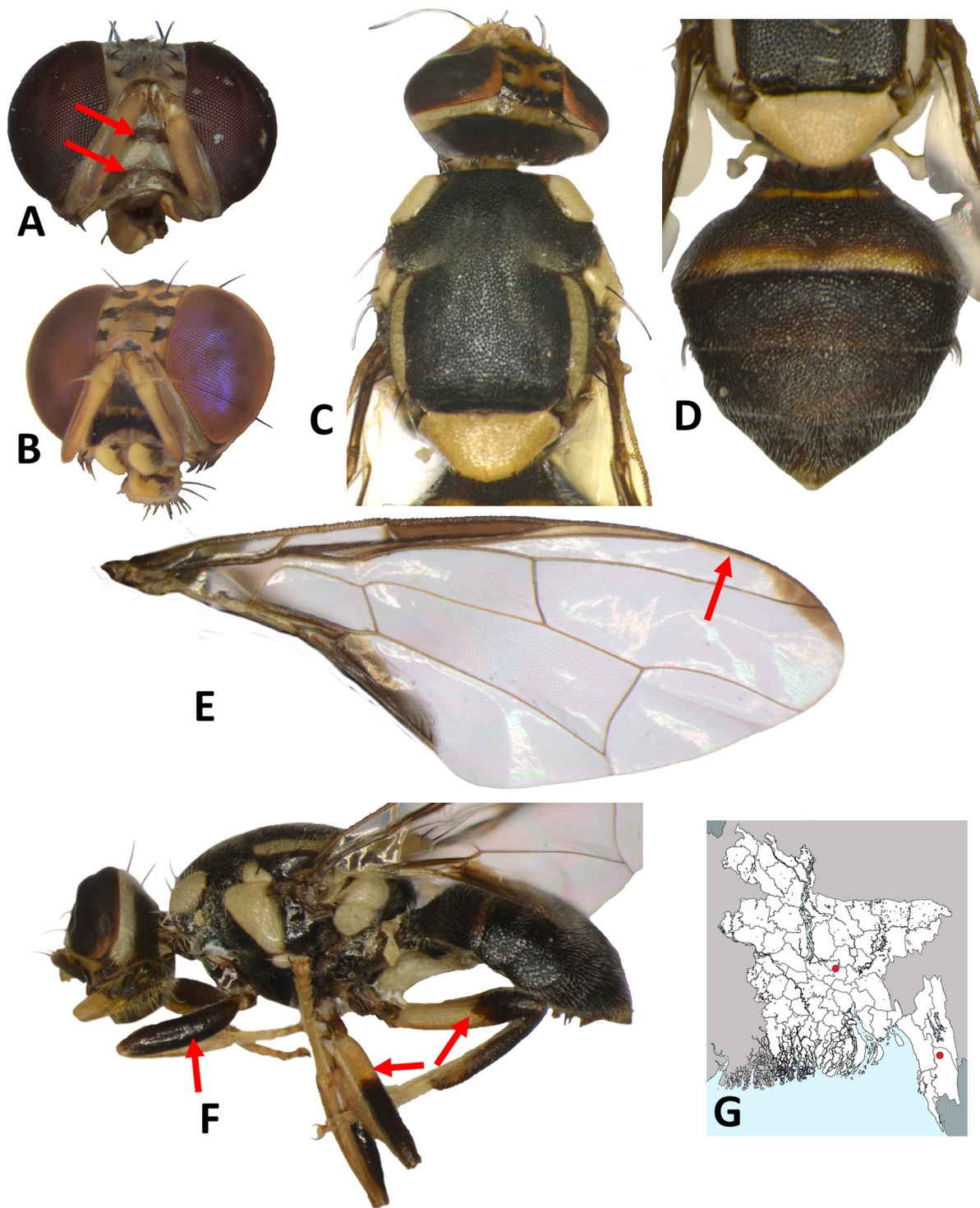


Figure 27. *Zeugodacus (Parasinodacus) cilifer* (Hendel), male. A-B) Head. C) Head and scutum. D) Abdomen. E) Wing. F) Lateral view. G) Distribution in Bangladesh.

***Zeugodacus (Javadacus) cucurbitae* (Coquillett, 1899)**

(= *Dacus aureus* Tseng and Chu, 1982, *Dacus yuiliensis* Tseng and Chu, 1992)

Figure 28

Distribution. Widespread throughout tropical Asia, from Pakistan to Taiwan and south to New Guinea and Solomon Islands; introduced to Africa, the Middle East, and various islands in the Indian and Pacific Oceans (see distribution map in Vargas et al. 2015).

Bangladesh records. 35,091 specimens. BARISHAL DIVISION: Barguna, Barishal, Bhola, Jhalokathi, Patuakhali, and Pirojpur Districts. CHATTOGRAM DIVISION: Bandarban Hill, Bramhanbaria, Chandpur, Chattogram, Cox's Bazar, Cumilla, Feni, Khagrachari Hill, Laxmipur, Noakhali, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Faridpur, Gazipur, Gopalganj, Kishorgonj, Manikganj, Narayanganj, Narsingdi, Rajbari, Shariatpur, and Tangail Districts. KHULNA DIVISION: Bagerhat, Chuadanga, Jashore, Jhenaidah, Kushtia, Meherpur, and Satkhira Districts. MYMENSINGH DIVISION: Jamalpur, Mymensingh, Netrokona, and Sherpur Districts. RAJSHAHI DIVISION: Bogura, Chapai Nawabgonj, Joypurhat, Naogaon, Natore, Pabna, Rajshahi, and Sirajganj Districts. RANGPUR DIVISION: Dinajpur, Gaibandha, Kurigram, Lalmonirhat, Nilphamari, Panchagarh, Rangpur, and Thakurgaon Districts. SYLHET DIVISION: Habiganj, Moulvibazar, Sunamgonj, and Sylhet Districts.

Male lure. Cue-lure, zingerone.

Host plants. A severe pest of cucurbit crops, also bred from a diversity of other families, with a total of 136 host taxa in 30 families (Allwood et al. 1999; McQuate et al. 2016). Hosts plants recorded in Bangladesh include: winter melon (*Benincasa hispida* (Thunb.) Cogn.), watermelon (*Citrullus lanatus* (Thunb.) Matsum. and Nakai), ivy gourd (*Coccinia grandis* (L.) Voigt), melon (*Cucumis melo* L.), cucumber (*C. sativus* L.), pumpkin (*Cucurbita pepo* L.), calabash (*Lagenaria siceraria* (Molina) Strandl.), angled luffa (*Luffa acutangula* (L.) Roxb.), smooth luffa (*L. cylindrica* (L.) M.Roem.), balsam-apple (*Momordica balsamina* L.), bittergourd (*M. charantia* L.), gac fruit (*M. cochinchinensis* (Lour.) Spreng.), spiny gourd (*M. dioica* Roxb. Ex Willd.), snakegourd (*Trichosanthes cucumerina* L.) (all Cucurbitaceae), tomato (*Lycopersicon esculentum* Mill.), and eggplant (*Solanum melongena* L.) (both Solanaceae) (Kabir et al. 1991; Akhtaruzzaman et al. 1999a; Amin et al. 2011; Alim et al. 2012).

Notes. In Bangladesh, Alim et al. (2012), Hossain et al. (2019) and Bose et al. (2021) studied the population fluctuations of melon fly at different locations of Bangladesh to develop control decisions. Chowdhury et al. (1993) first initiated melon fly control strategy in bitter gourd field using poison food bait. Akhtaruzzaman et al. (1999b) initiated bagging of cucumber to prevent melon fly infestation.

***Zeugodacus (Zeugodacus) diaphorus* (Hendel, 1915)**

(= *Chaetodacus ater* Chen, 1940, *Dacus lunulatus* Tseng, Chen and Chu, 1992, *Dacus guangxianua* Chao and Lin, 1993, *Dacus sicienti* Chao and Lin, 1993, *Bactrocera proprediaiphora* Wang, Xiao and Chen in Wang et al. 2008)

Figure 29

Distribution. Widespread in tropical Asia, from India and Sri Lanka to Taiwan, Vietnam and Indonesia (south to Sumatra) (Drew and Romig 2013). This species was misidentified in Bangladesh as *Bactrocera bogorensis* (Hardy) by Leblanc et al. (2014), and the erroneous record was rectified by Leblanc et al. (2019b).

Bangladesh records. 12 specimens. MYMENSINGH DIVISION: Sherpur District. RAJSHAHI DIVISION: Joypurhat District. RANGPUR DIVISION: Gaibandha, Kurigram, and Lalmonirhat Districts.

Male lure. Cue-lure.

Host plants. No known record.

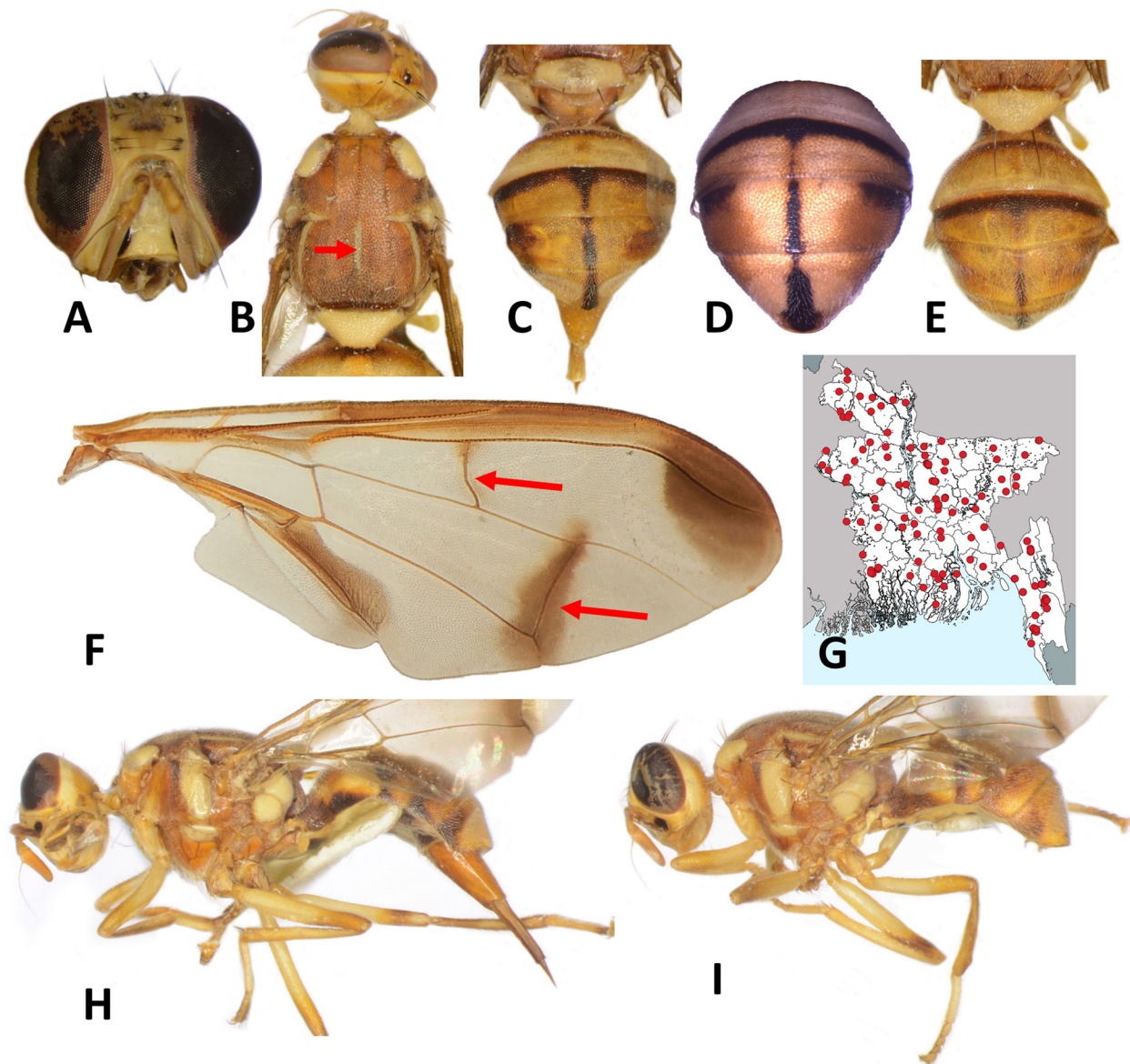


Figure 28. *Zeugodacus (Javadacus) cucurbitae* (Coquillett). A) Head. B) Head and scutum. C) Abdomen, female. D-E) Abdomen, male. F) Wing (after Leblanc et al. 2014). G) Distribution in Bangladesh. H) Lateral view, female. I) Lateral view, male.

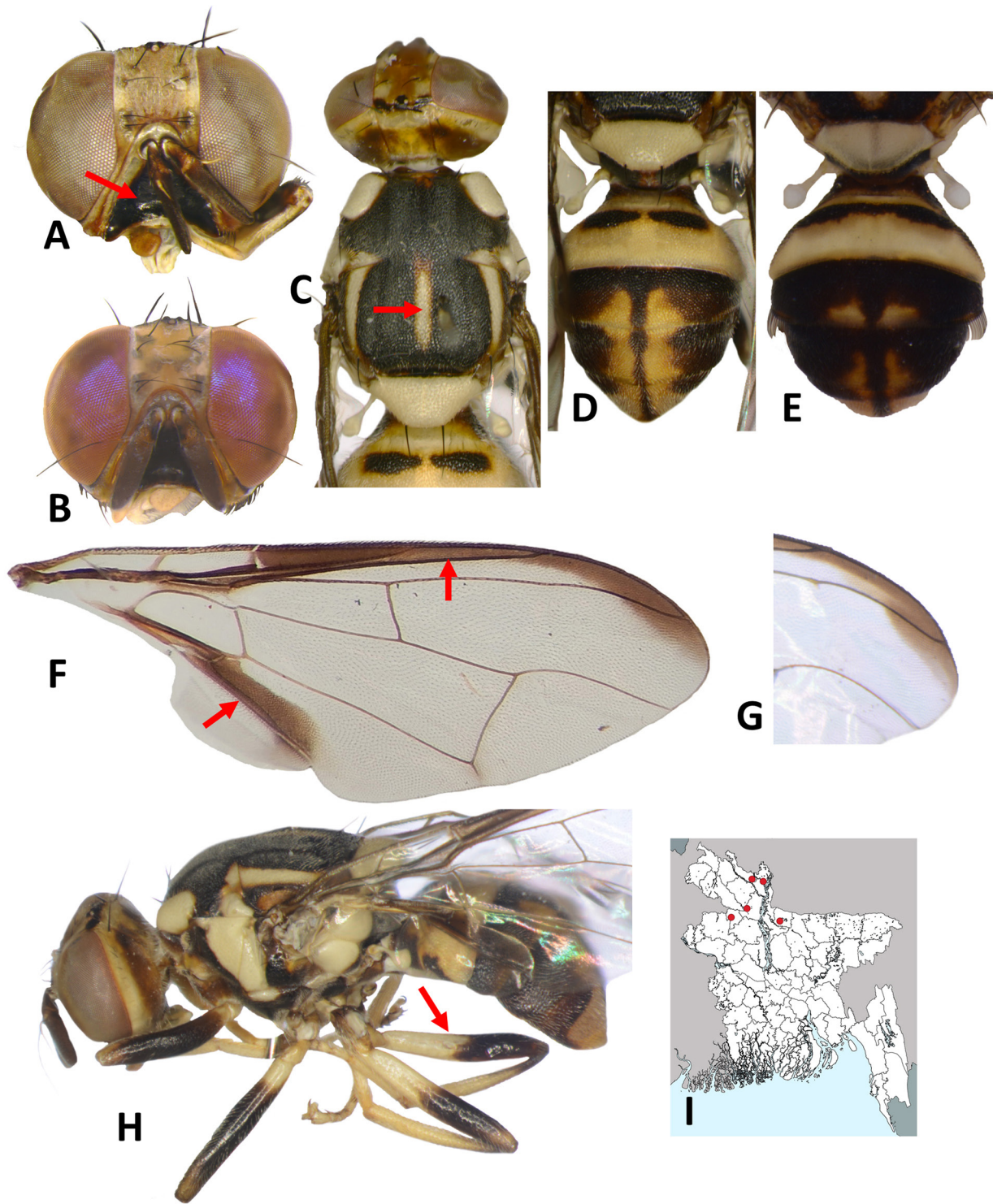


Figure 29. *Zeugodacus (Zeugodacus) diaphorus* (Hendel), male. A-B) Head. C) Head and scutum. D-E) Abdomen. F) Wing (after Leblanc et al. 2014). G) Wing apex, variant. H) Lateral view. I) Distribution in Bangladesh.

***Zeugodacus (Zeugodacus) diversus* (Coquillett, 1904)**

(= *Dacus quadrifidus* Hendel, 1928, *Dacus latifae* Anwar Cheema, 1964, *Dacus citronellae* Kapoor and Katiyar, 1969)

Figure 30

Distribution. India, Sri Lanka (Coquillett 1904), China, Nepal, Thailand (Norrbom et al. 1999), Pakistan, Vietnam (Drew and Romig 2013), Bangladesh (Kabir et al. 1991).

Bangladesh records. 227 specimens. CHATTOGRAM DIVISION: Khagrachari Hill District. DHAKA DIVISION: Dhaka and Narsingdi Districts. RAJSHAHI DIVISION: Natore District. SYLHET DIVISION: Moulvibazar District.

Male lure. Poorly captured in methyl eugenol and zingerone baited traps, but strongly attracted to methyl-isoeugenol (Royer et al. 2018).

Host plants. Bred from flowers of nine species of Cucurbitaceae (Allwood et al. 1999). Liquido et al. (2019) reported that it is also known to secondarily feed on and damage cucurbit fruits as well, and list 13 hosts in 10 genera and four families for this species.

Note. Molla et al. (2000) studied the detailed life history and documented the seasonal prevalence of *Z. diversus* in Bangladesh.

***Zeugodacus (Sinodacus) hochii* (Zia, 1936)**

(= *Sinodacus laterum* Wang, 1988, *Sinodacus quaternum* Wang, 1988, *Sinodacus hainanus* Chao and Lin, 1996, *Sinodacus jiannanus* Chao and Lin, 1996, *Sinodacus jinreni* Chao and Lin, 1996, *Sinodacus qionganus* Chao and Lin, 1996, *Sinodacus rubzovi* Chao and Lin, 1996)

Figure 31

Distribution. China (Zia 1936), Indonesia, Malaysia (Peninsular), Thailand (Norrbom et al. 1999), Vietnam (Drew and Romig 2013), Bangladesh (Leblanc et al. 2013), Laos (Leblanc et al. 2016).

Bangladesh records. 13 specimens. CHATTOGRAM DIVISION: Bandarban Hill and Chattogram Districts. DHAKA DIVISION: Tangail District. SYLHET DIVISION: Habiganj District.

Male lure. Cue-lure, zingerone.

Host plants. *Gymnopetalum chinense* (Lour.) Merr., *Luffa aegyptiaca* Mill., and *Trichosanthes wawraei* Cogn. (Cucurbitaceae) (Allwood et al. 1999).

***Zeugodacus (Parasinodacus) incisus* (Walker, 1861)**

(= *Dacus poonnensis* Kapoor, 1971)

Figure 32

Distribution. Myanmar (Walker 1861), India, Thailand (Norrbom et al. 1999), China (Chen et al. 2011), India (Andaman Island) (David and Ramani, 2011), Malaysia (Peninsular), Vietnam (Drew and Romig 2013), Bangladesh (Leblanc et al. 2019b).

Bangladesh records. 67 specimens. CHATTOGRAM DIVISION: Bandarban Hill, Chattogram, and Cox's Bazar Districts. DHAKA DIVISION: Narayanganj District. RANGPUR DIVISION: Panchagarh District.

Male lure. Cue-lure.

Host plants. No known record.

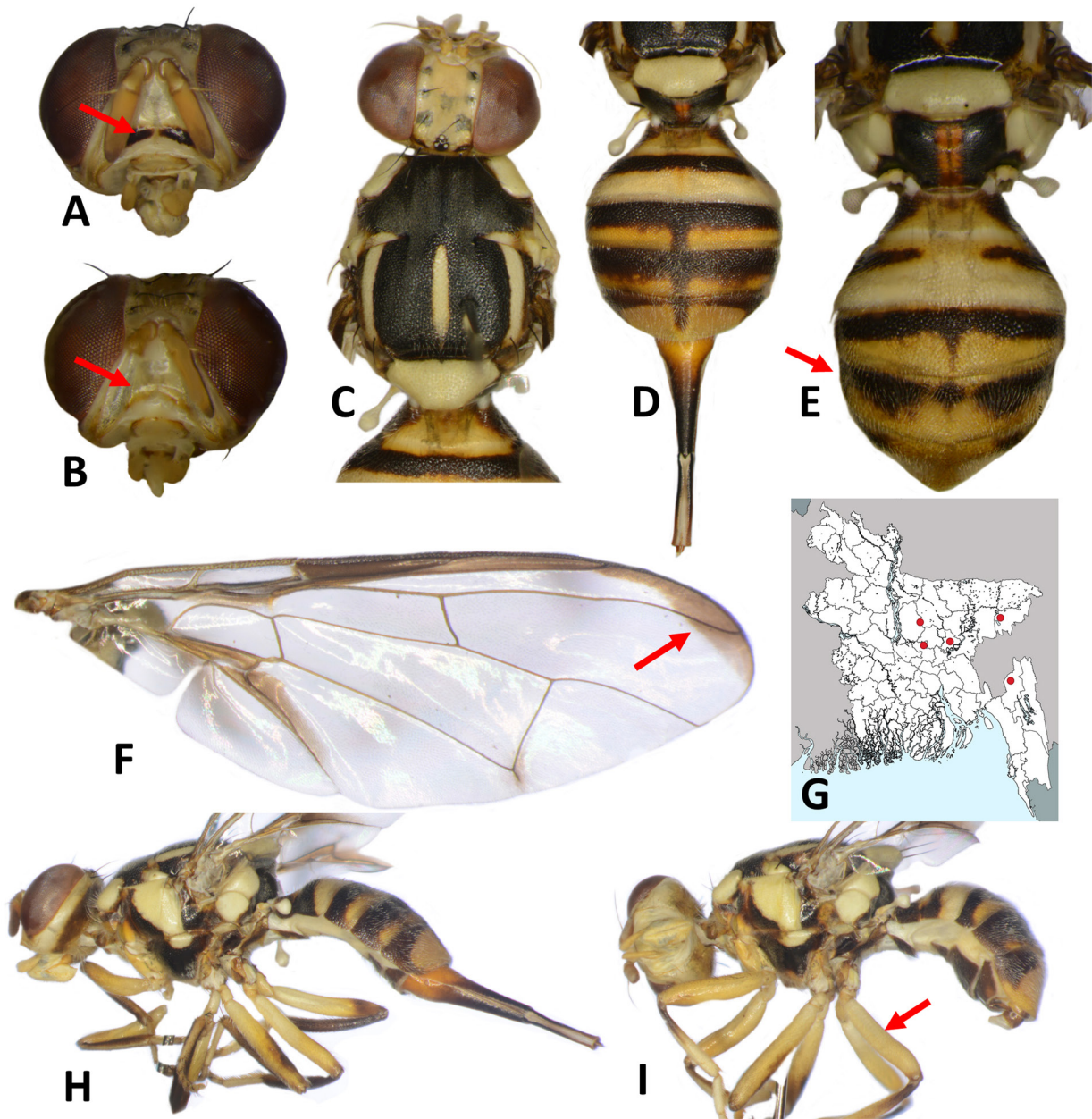


Figure 30. *Zeugodacus (Zeugodacus) diversus* (Coquillett). A) Head, female. B) Head, male. C) Head and scutum. D) Abdomen, female. E) Abdomen, male. F) Wing. G) Distribution in Bangladesh. H) Lateral view, female. I) Lateral view, male.

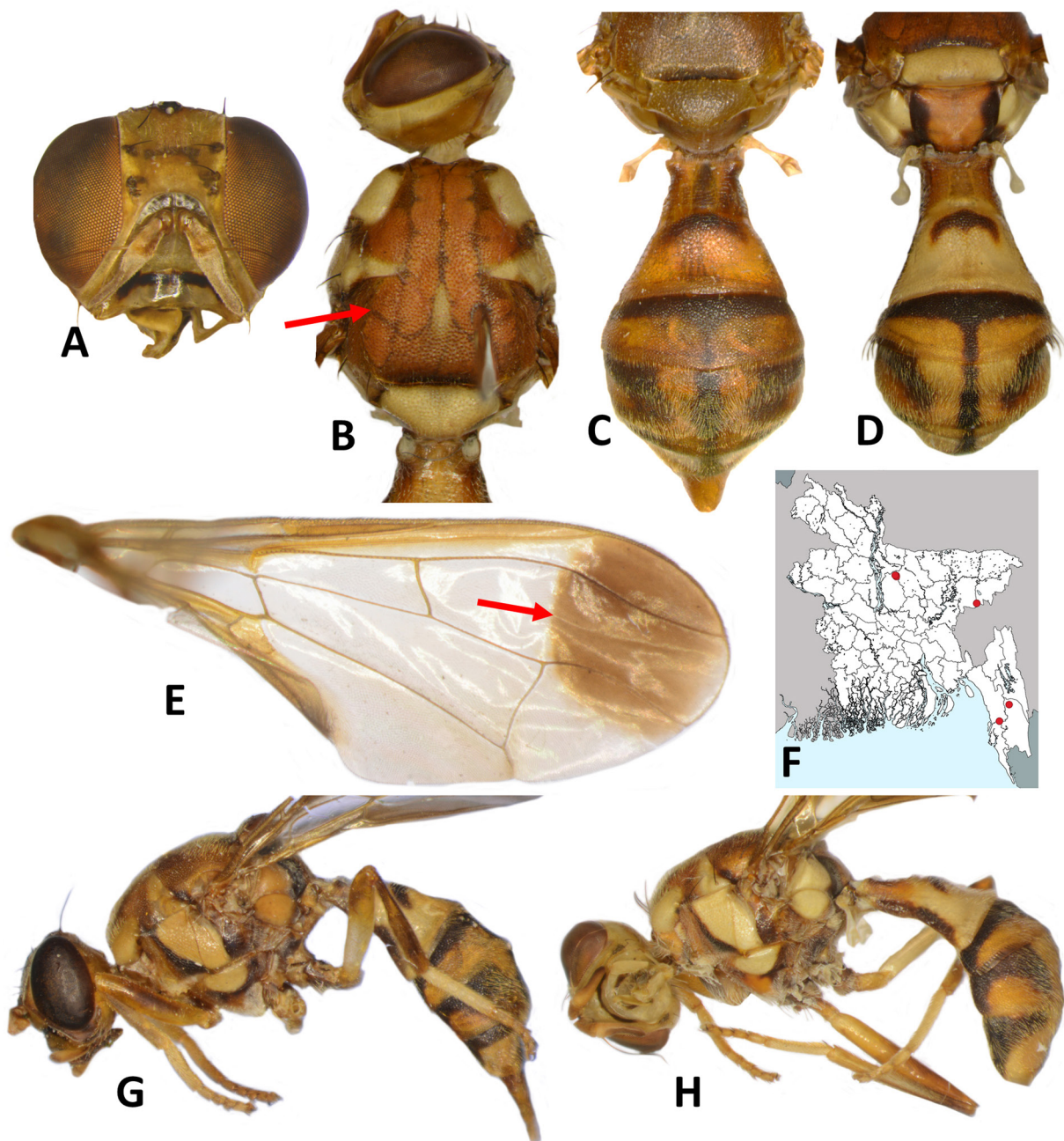


Figure 31. *Zeugodacus (Sinodacus) hochii* (Zia). A) Head. B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E) Wing. F) Distribution in Bangladesh. G) Lateral view, female. H) Lateral view, male.

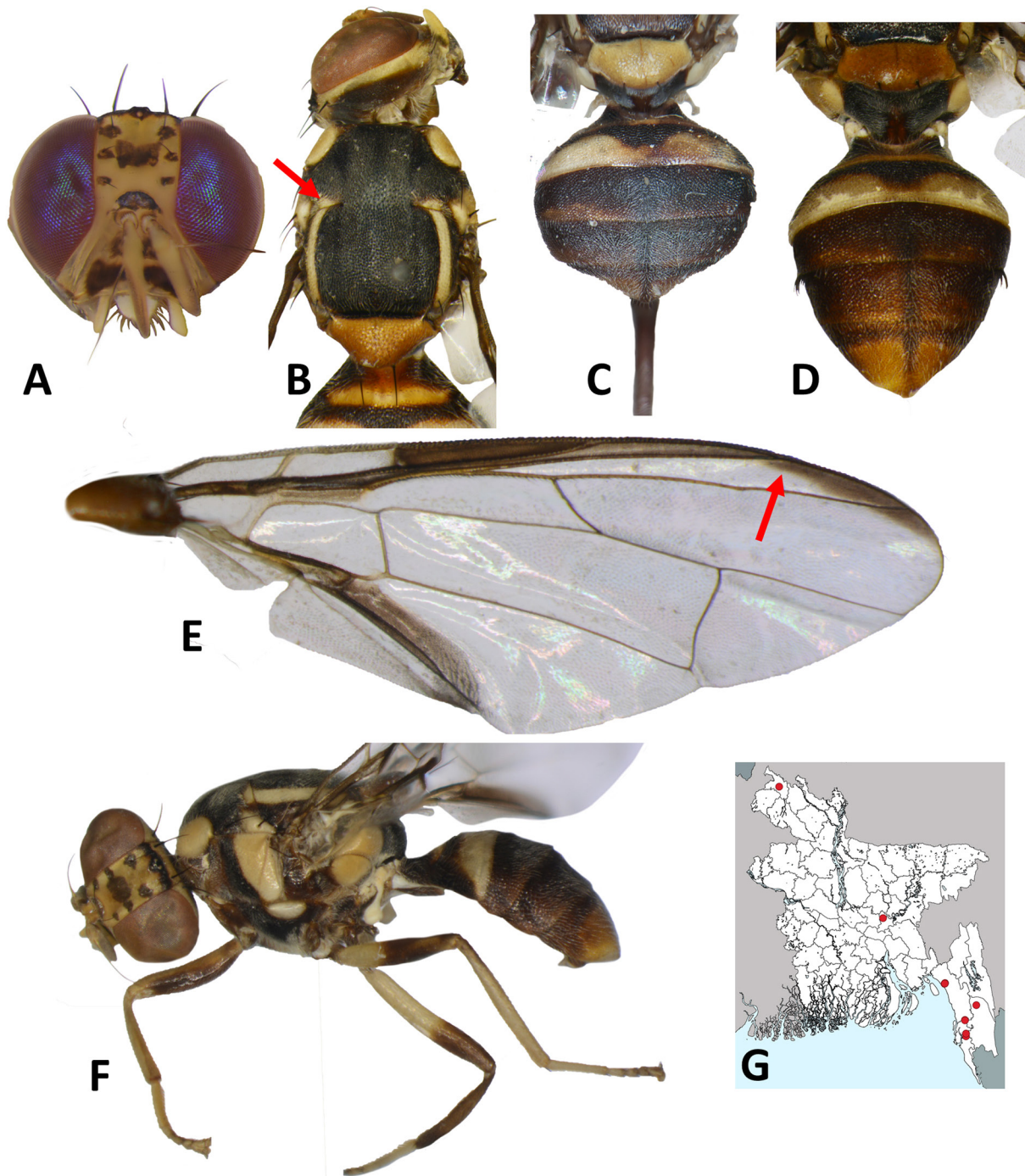


Figure 32. *Zeugodacus (Parasinodacus) incisus* (Walker). A) Head. B) Head and scutum. C) Abdomen, female. D) Abdomen, male. E) Wing. F) Lateral view, male. G) Distribution in Bangladesh.

***Zeugodacus (Sinodacus) infestus* (Enderlein, 1920)**

Figure 33

Distribution. Indonesia (Enderlein 1920), Thailand (Hardy 1973), Malaysia (Peninsular), Vietnam (Drew and Romig 2013), Laos (Leblanc et al. 2016), Bangladesh (Leblanc et al. 2019b).

Bangladesh records. Two specimens. CHATTOGRAM DIVISION: Chattogram and Khagrachari Hill Districts.

Male lure. Cue-lure.

Host plants. No known record.

***Zeugodacus (Sinodacus) madhupuri* Leblanc and Dooreenweerd, 2019**

Figure 34

Distribution. Bangladesh (Leblanc et al. 2019b).

Bangladesh records. Four specimens. DHAKA DIVISION: Tangail District.

Male lure. Cue-lure.

Host plants. No known record.

***Zeugodacus (Javadacus) tau* (Walker, 1849)**

(= *Dacus hageni* Meijere, 1911, *Dacus nubilus femoralis* Hendel, 1934, *Dacus elegantis* Tseng, Chen and Chu, 1992, *Dacus flavus* Tseng, Chen and Chu, 1992)

Figure 35

Distribution. Widespread in tropical Asia, from India and Sri Lanka to Vietnam and Taiwan, and south to Indonesia (Drew and Romig 2013), Cambodia, Laos (Leblanc et al. 2016), Nepal (Sharma et al. 2015), Bangladesh (Kabir et al. 1991).

Bangladesh records. 21,185 specimens. BARISHAL DIVISION: Barguna, Barishal, Bhola, Jhalokathi, Patuakhali, and Pirojpur Districts. CHATTOGRAM DIVISION: Bandarban Hill, Bramhanbaria, Chandpur, Chattogram, Cox's Bazar, Cumilla, Feni, Khagrachari Hill, Laxmipur, Noakhali, and Rangamati Hill Districts. DHAKA DIVISION: Dhaka, Faridpur, Gazipur, Gopalganj, Kishorgonj, Madaripur, Manikganj, Munshiganj, Narayanganj, Narsingdi, Rajbari, Shariatpur, and Tangail Districts. KHULNA DIVISION: Bagerhat, Chuadanga, Jashore, Jhenaidah, Kushtia, Magura, Meherpur, Narail, and Satkhira Districts. MYMENSINGH DIVISION: Jamalpur, Mymensingh, Netrokona, and Sherpur Districts. RAJSHAHI DIVISION: Bogura, Chapai Nawabgonj, Joypurhat, Naogaon, Natore, Pabna, Rajshahi, and Sirajgonj Districts. RANGPUR DIVISION: Dinajpur, Gaibandha, Kurigram, Lalmonirhat, Nilphamari, Panchagarh, Rangpur, and Thakurgaon Districts. SYLHET DIVISION: Habiganj, Moulvibazar, Sunamgonj, and Sylhet Districts.

Male lure. Cue-lure.

Host plants. Primarily a pest of cucurbit fruits, though its host range is much broader, as it has been bred from 77 host taxa in 44 genera and 23 families (Liquido et al. 2016a). Hosts in Bangladesh include: winter melon (*Benincasa hispida* (Thunb.) Cogn.), melon (*Cucumis melo* L.), cucumber (*C. sativus* L.), pumpkin (*Cucurbita pepo* L.), calabash (*Lagenaria siceraria* (Molina) Strandl.), angled luffa (*Luffa acutangula* (L.) Roxb.), smooth luffa (*L. cylindrica* (L.) M.Roem.), bittergourd (*Mormodica charantia* L.), gac fruit (*M. cochinchinensis* (Lour.) Spreng.), spiny gourd (*M. dioica* Roxb. Ex Willd.), and snakegourd (*Trichosanthes cucumerina* L.) (all Cucurbitaceae) (Kabir et al. 1991; Akhtaruzzaman et al. 1999a; Huque 2006).

Notes. In Bangladesh, Hossain et al. (2019) studied the seasonal abundance of *Z. tau* to develop a control strategy. Chowdhury et al. (1993) initiated a melon fly and pumpkin fly control strategy in bitter gourd field using poison bait. Akhtaruzzaman et al. (1999b) initiated bagging method in cucumber to prevent pumpkin fly infestation. The detailed life history of this species in Bangladesh was published by Kabir et al. (1997).

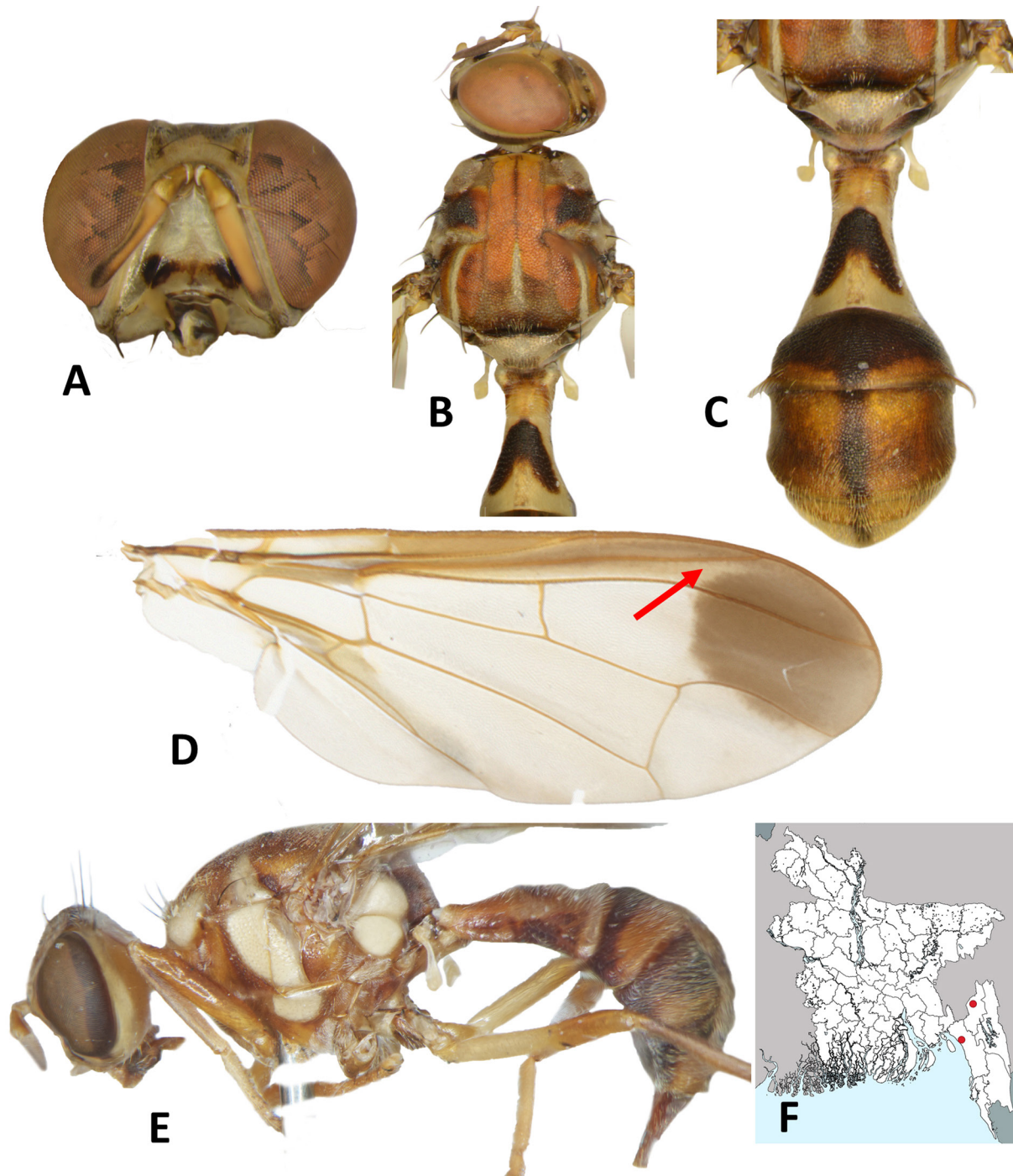


Figure 33. *Zeugodacus (Sinodacus) infestus* (Enderlein). A) Head. B) Head and scutum. C) Abdomen, male. D) Wing. E) Lateral view, female. F) Distribution in Bangladesh.

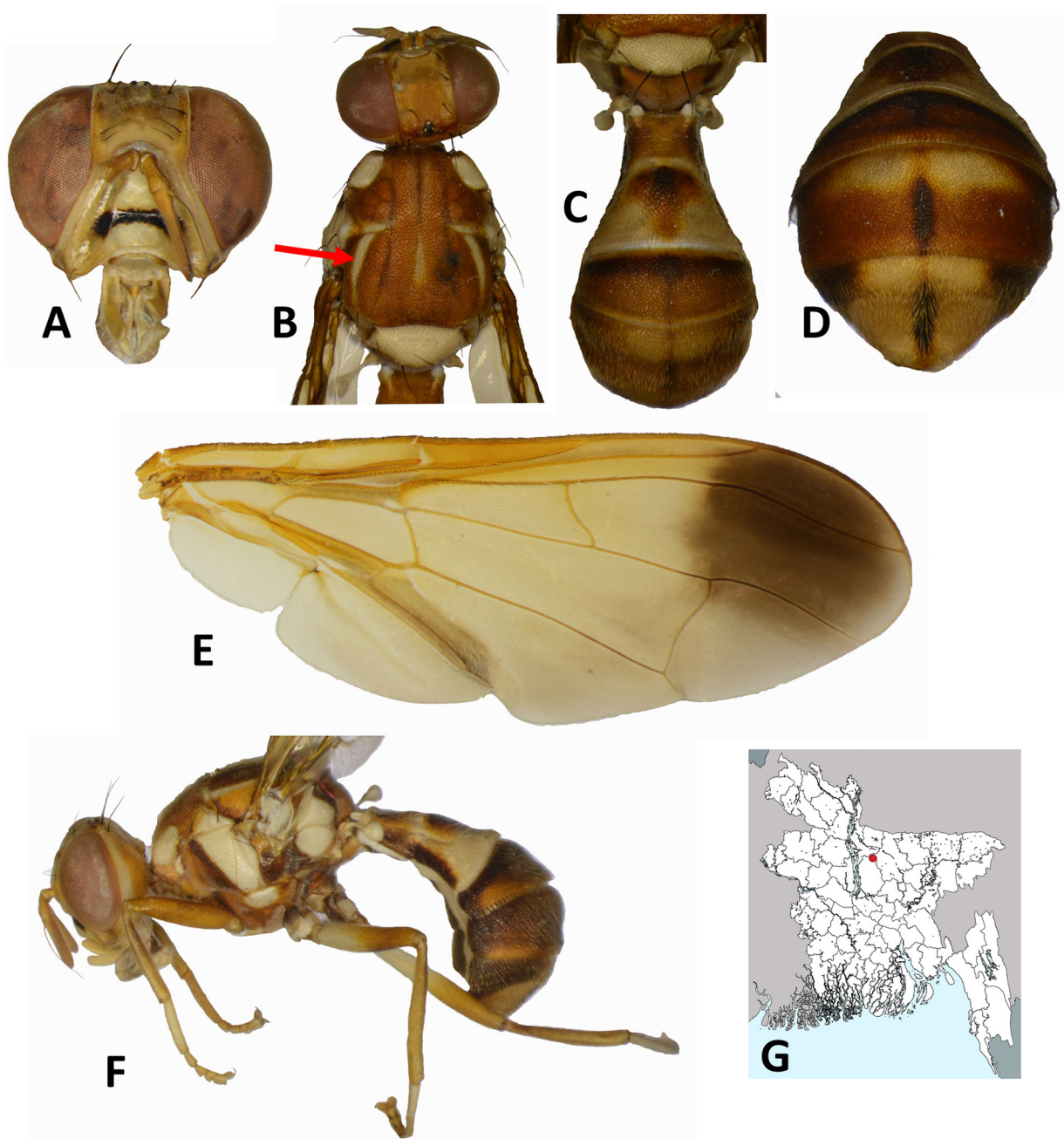


Figure 34. *Zeugodacus (Sinodacus) madhupuri* Leblanc and Doorenweerd, male. A) Head. B) Head and scutum. C-D) Abdomen. E) Wing. F) Lateral view. G) Distribution in Bangladesh. A-F after Leblanc et. al. (2019).

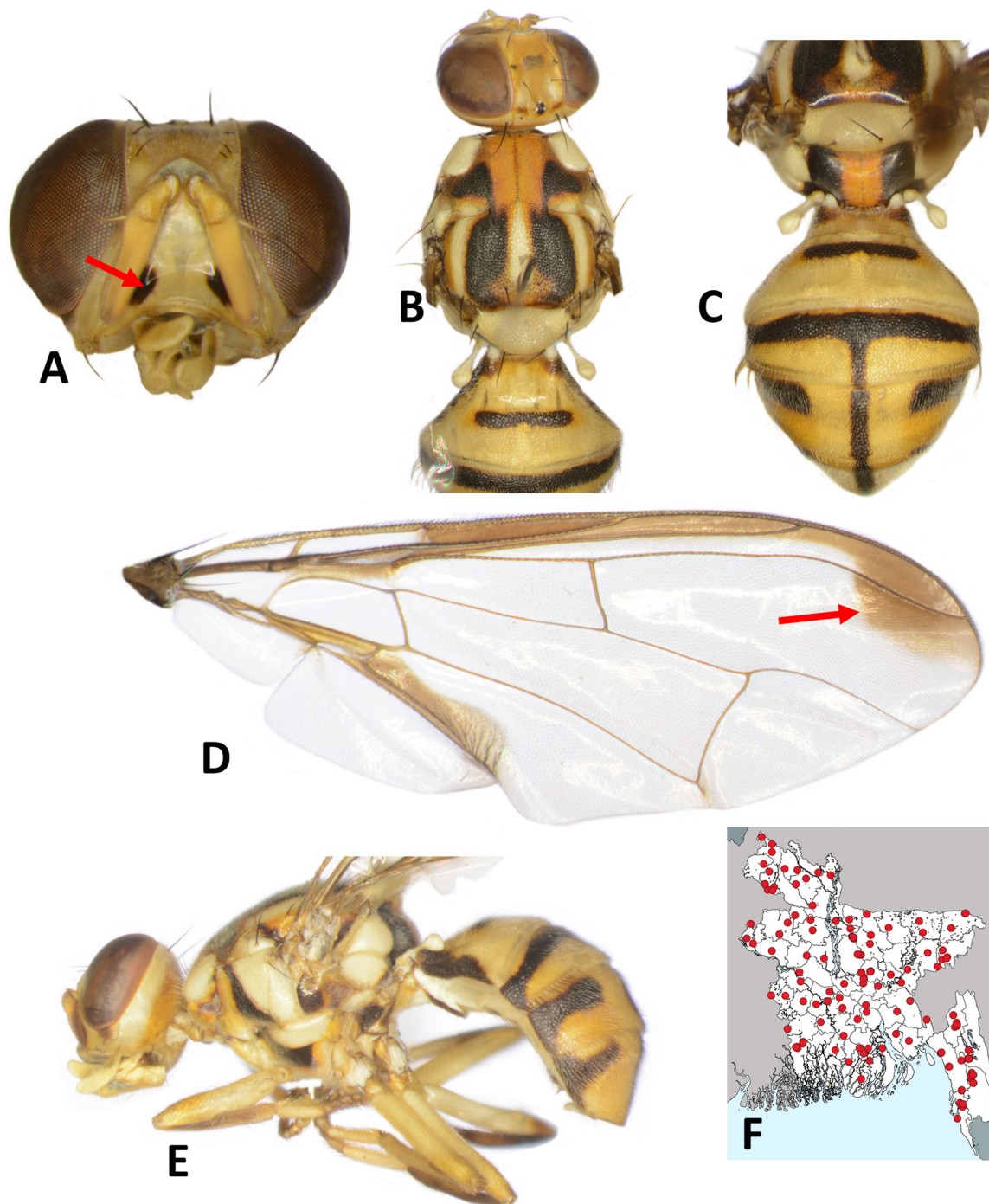


Figure 35. *Zeugodacus (Javadacus) tau* (Walker), male. A) Head. B) Head and scutum. C) Abdomen. D) Wing. E) Lateral view. F) Distribution in Bangladesh.

Key to the species of dacine fruit flies recorded in Bangladesh

1. Large wasp-like red-brown fly (wing at least 8 mm long) with abdominal base of syntergite 1+2 longer than broad (Fig. 23C) and wing costal band very broadly overlapping vein R_{4+5} (Fig. 23D) 2
- Smaller fly (wing less than 8 mm long) with abdominal base of syntergite 1+2 broader than long (Fig. 25C) and wing costal band narrower, at most reaching vein R_{4+5} (Fig. 10D) 3
2. Face fulvous with two small oval black spots; males attracted to cue-lure; (Fig. 23) *Dacus (Callantra) longicornis* Wiedemann
- Face reddish brown with a large inverted U-shaped black marking; males attracted to cue-lure; (Fig. 22) *Dacus (Mellesis) jacobi* David and Sachin
- 3(1). Scutum with yellow median postsutural vitta (Fig. 29C), though sometimes very reduced (Fig. 28B) .. 4
- Scutum without yellow median postsutural vitta 13
- 4(3). Wing with infuscations present along r-m and dm-cu crossveins, in addition to the costal band and anal streak; males attracted to cue-lure; (Fig. 28) *Zeugodacus (Javadacus) cucurbitae* (Coquillett)
- Wing with infuscations restricted to the costal band and anal streak (Fig. 29F) 5
- 5(4). Apex of costal band on wing greatly expanded into an enlarged circular spot (Fig. 31E) 6
- Apex of costal band on wing not so greatly expanded (Fig. 35C) 9
- 6(5). Lateral postsutural vitta absent or at most very short and narrow males attracted to cue-lure; (Fig. 31) .
..... *Zeugodacus (Sinodacus) hochii* (Zia)
- Lateral postsutural vitta well developed (Fig. 34B) 7
- 7(6). Wing membrane with a fulvous tinge, in addition to fuscous costal band and anal streak; males attracted to cue-lure; (Fig. 34) *Zeugodacus (Sinodacus) madhupuri* Leblanc and Dooreneerd
- Wing membrane nearly hyaline, other than fuscous costal band and anal streak 8
- 8(7). Anterior supra-alar seta present; costal band complete, not interrupted beyond the apex of vein R_{2+3} ; males attracted to cue-lure; (Fig. 33) *Zeugodacus (Sinodacus) infestus* (Enderlein)
- Anterior supra-alar seta absent; costal band interrupted between the apex of vein R_{2+3} and the large apical spot; males attracted to cue-lure; (Fig. 24) *Zeugodacus (Asiadacus) apicalis* (Meijere)
- 9(5). Face fulvous with a pair of circular to oval black spots (Fig. 35A); apex of wing costal band expanded into an apical spot; males attracted to cue-lure; (Fig. 35) *Zeugodacus (Javadacus) tau* (Walker)
- Face either uniformly black (Fig. 29A), or fulvous, with (Fig. 30A) or without (Fig. 30B) a transverse black band; apex of wing costal band at most slightly expanded (Fig. 30F) 10
- 10(9). Face entirely black (Fig. 29A); femora basally fulvous and apically dark fuscous to black (Fig. 29H) .. 11
- Face fulvous, with (Fig. 30A) or without (Fig. 30B) a transverse dark band; femora mostly or entirely fulvous (Fig. 30I) 12
- 11(10). Scutellum with one pair of setae; males attracted to cue-lure; (Fig. 29)
..... *Zeugodacus (Zeugodacus) diaphorus* (Hendel)
- Scutellum with two pairs of setae; males attracted to cue-lure; (Fig. 25)
..... *Zeugodacus (Zeugodacus) atrifacies* Perkins
- 12(10). Face entirely fulvous in male (Fig. 30B), fulvous with transverse dark band across oral margin in female (Fig. 30A); scutellum with one pair of setae (rarely two pairs in male); male abdomen without pecten (Fig. 30E); males weakly attracted to methyl eugenol and zingerone, and strongly attracted to methyl-isoeugenol; (Fig. 30) *Zeugodacus (Zeugodacus) diversus* (Coquillett)
- Face entirely fulvous with transverse dark band across oral margin in both sexes (Fig. 26A); scutellum with two pairs of setae; male abdomen with pecten (Fig. 26D); males attracted to cue-lure; (Fig. 26) *Zeugodacus (Zeugodacus) caudatus* (Fabricius)
- 13(3). Costal band interrupted (Fig. 20D) or drastically narrowed (Fig. 27E) before reaching its apex 14
- Costal band not interrupted before reaching its apex (Fig. 32E) 17

- 14(13). Scutum and abdomen red-brown; males attracted to methyl eugenol; (Fig. 20) *Bactrocera (Bactrocera) zonata* (Saunders)
 — Scutum predominantly to entirely black; abdomen black or predominantly red-brown 15
- 15(14). Abdomen red-brown with a dark T-shaped pattern on terga III–V (Fig. 5C); males attracted to methyl eugenol; (Fig. 5) *Bactrocera (Bactrocera) correcta* (Bezzi)
 — Abdomen predominantly or entirely black 16
- 16(15). Legs entirely fulvous (Fig. 19H); face fulvous with a pair of oval black spots (Fig. 19A); males attracted to methyl eugenol; (Fig. 19) *Bactrocera (Bactrocera) tuberculata* (Bezzi)
 — Fore femur black and mid and hind femora basally fulvous and apically black (Fig. 27F); face fulvous with two parallel transverse black bands, across oral margin and below antennal sockets (Fig. 27A); males attracted to cue-lure; (Fig. 27) *Zeugodacus (Parasinodacus) cilifer* (Hendel)
- 17(13). Yellow lateral postsutural vitta absent (Fig. 21B); scutum and abdomen predominantly red-brown (Fig. 21B); abdomen with tergites fused into a single plate; no known male lure; (Fig. 21) *Dacus (Didacus) ciliatus* Loew
 — Yellow lateral postsutural vitta present (Fig. 10B), though sometimes very short; scutum and abdomen color variable; abdomen with tergites not fused 18
- 18(17). Costal band very broad and confluent with vein R_{4+5} (Fig. 10D) 19
 — Costal band narrower, at most overlapping vein R_{2+3} but never reaching vein R_{4+5} (Fig. 17D) 20
- 19(18). Scutellum with one pair of setae; abdominal sternum V with a deep concavity on posterior margin in male; apex of aculeus of ovipositor needle-like in female; males attracted to cue-lure; (Fig. 10) *Bactrocera (Bactrocera) limbifera* (Bezzi)
 — Scutellum with two pairs of setae; abdominal sternum V with a slight concavity on posterior margin in male; apex of aculeus of ovipositor trilobed (needle-like with two subapical teeth) in female; no known male lure; (Fig. 11) *Bactrocera (Paratridacus) melania* (Hardy and Adachi)
- 20(18). Scutellum yellow with a broad medial longitudinal black stripe, with two pairs of setae; males attracted to zingerone; (Fig. 1) *Bactrocera (Parazeugodacus) abbreviata* (Hardy)
 — Scutellum entirely yellow, with one or two pairs of setae 21
- 21(20). Fore and middle femora apically or entirely black; apex of hind femur black; abdomen predominantly or mostly black 22
 — Femora fulvous or red-brown with at most a dark anterior subapical dorsal spot on fore femur (Fig. 4E); abdomen pale colored, sometimes with broad lateral black markings 26
- 22(21). Scutellum with two pairs of setae; lateral postsutural vitta very short; males attracted to zingerone; (Fig. 15) *Bactrocera (Parazeugodacus) pendleburyi* (Perkins)
 — Scutellum with one pair of setae; lateral postsutural vitta short or well developed 23
- 23(22). Lateral postsutural vitta very short (Fig. 14B); anepisternal yellow stripe reaching to anterior notopleural seta dorsally (Fig. 14F); males attracted to cue-lure; (Fig. 14) *Bactrocera (Bactrocera) nigrofemoralis* White and Tsuruta
 — Lateral postsutural vitta well developed and ending at level of intra-alar seta; anepisternal yellow stripe not reaching to anterior notopleural seta dorsally 24
- 24(23). Scutum with yellow spot anterior to transverse suture (Fig. 32B); prescutellar acrostichal seta absent; males attracted to cue-lure; (Fig. 32) *Zeugodacus (Parasinodacus) incisus* (Walker)
 — Scutum without yellow spot anterior to transverse suture; prescutellar acrostichal seta present 25
- 25(24). Face fulvous with a black band across oral margin (Fig. 13A); abdominal terga entirely black (Fig. 13C); males attracted to cue-lure; (Fig. 13) *Bactrocera (Bactrocera) nigrifemorata* Lin and Wang
 — Face black (Fig. 12A) or dark fuscous with a pair of large oval dark spots; abdomen black with orange-brown medially on terga III–V (Fig. 12C); males attracted to cue-lure; (Fig. 12) *Bactrocera (Bactrocera) nigrifacia* Zhang, Ji and Chen

- 26(21). Abdomen orange-brown, without a T-shaped dark pattern (Fig. 9C); apex of wing costal band expanded (Fig. 9D); males attracted to latilure; (Fig. 9) ***Bactrocera (Bactrocera) latifrons (Hendel)***
- Abdomen with a T-shaped pattern, with or without extensive lateral dark markings; apex of costal band not as expanded (Fig. 17D) 27
- 27(26). Anterior supra-alar seta (on scutum between wing attachment and yellow lateral postsutural vitta) and prescutellar acrostichal seta absent; scutum and abdomen predominantly orange-brown, abdomen with a very narrow dark T-shaped pattern (Fig. 6C); femora predominantly red-brown; males attracted to cue-lure and zingerone; (Fig. 6) ***Bactrocera (Daculus) digressa Radhakrishnan***
- Anterior supra-alar seta and prescutellar acrostichal seta present; scutum color variable and abdomen with a T-shaped pattern, with medial stripe narrow (Fig. 17C) to broad (Fig. 16C); femora fulvous with at most small anterior subapical dorsal spot on fore femur 28
- 28(27). Anepisternal yellow stripe very broad, extended anteriorly and reaching anterior notopleural seta dorsally (Fig. 2E); males attracted to methyl eugenol; (Fig. 2) ***Bactrocera (Bactrocera) aethriobasis (Hardy)***
- Anepisternal yellow stripe narrower, not reaching anterior notopleural seta dorsally (Fig. 17E) 29
- 29(28). Scutum uniformly red-brown with at most a faint lanceolate pattern (Fig. 17B); abdomen red-brown with a faint or incomplete T-shaped pattern with the medial stripe very narrow (Fig. 17C); wing costal band confluent with or faintly overlapping vein R_{2+3} and slightly expanded apically (Fig. 17D); males attracted to cue-lure; (Fig. 17) ***Bactrocera (Bactrocera) rubigina (Wang and Zhao)***
- Scutum color highly variable, from predominantly orange-brown to predominantly or entirely black; abdomen orange-brown with a usually well-defined T-shaped pattern with the medial stripe usually broader, with limited to extensive lateral black markings; wing costal band confluent with or faintly overlapping vein R_{2+3} and slightly to moderately expanded apically (Fig. 4D), or confluent with vein R_{2+3} and not expanded apically (Fig. 8A) 30
- 30(29). Scutum entirely black, without orange-brown markings (Fig. 18B); abdomen terga III-V with very broad black lateral markings (Fig. 18C); males attracted to zingerone; (Fig. 18) ***Bactrocera (Bactrocera) syzygii White and Tsuruta***
- Scutum varies from predominantly orange-brown to predominantly or entirely black, with limited orange-brown markings; abdomen terga III-V largely orange-brown, with reduced black lateral markings 31
- 31(30). Wing costal band faintly overlapping vein R_{2+3} and slightly expanded beyond apex of vein R_{2+3} (Fig. 4D); fore femur usually with a dark fuscous to black anterior subapical dorsal spot (Fig. 4E); abdomen tergum IV with rectangular lateral black bands along its base (Fig. 4C, E); males attracted to methyl eugenol; (Fig. 4) ***Bactrocera (Bactrocera) carambolae Drew and Hancock***
- Wing costal band confluent with or faintly overlapping vein R_{2+3} , with or without apical expansion; fore femur with or without an anterior subapical dorsal spot; abdomen usually not as above, if with basolateral bands on tergum IV then scutum with parallel longitudinal red-brown medial vittae (Fig. 3B) 32
- 32(31). Wing costal band confluent with vein R_{2+3} vein, and not expanded or at most very slightly expanded apically (Fig. 8A); scutum color pattern highly variable, from almost entirely black to black with variable lanceolate orange-brown pattern to entirely orange-brown (Fig. 7E-L); abdomen with a T-shaped pattern with medial stripe narrow, and limited to extensive lateral dark markings (Fig. 7C, D, M-Q); males attracted to methyl eugenol; (Fig. 7-8) ***Bactrocera (Bactrocera) dorsalis (Hendel)***
- Wing costal band at least faintly overlapping vein R_{2+3} , appearing as a faint tinge below the vein, and expanded apically (Fig. 3D, 16D); scutum color pattern as in Fig. 3B or 16B; abdomen with a T-shaped pattern with medial stripe broader and with generally limited lateral dark markings (Fig. 3C, 16C) 33

- 33(32). Scutum black medially and orange-brown laterally (Fig. 16B); femora fulvous with a faint dark anterior subapical dorsal spot on fore femur; males attracted to cue-lure; (Fig. 16) *Bactrocera (Bactrocera) propinqua* (Hardy and Adachi)
- Scutum orange-brown with one narrow medial and two narrow lateral black stripes connected near apex of scutum (Fig. 3B); femora entirely fulvous; males attracted to methyl eugenol; (Fig. 3) *Bactrocera (Bactrocera) bhutaniae* (Hardy)

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